Sheet Metal Industries

The Only Journal in the World wholly devoted to the Manufacture, Manipulation, Fabrication, Welding, Assembly and Finishing of Ferrous and Non-Ferrous Sheet and Strip

VOL. 37 : No. 398 JUNE 1960 PRICE 2/6

MATRIX
COVENTRY GAUGE & TOOL COMPANY LTD.
QUALITY

The Only British Designed and Built

JIG GRINDING MACHINE

A product of the COVENTRY GAUGE & TOOL CO. LTD. who have unique experience in designing and manufacturing both JIG BORING and precision GRINDING MACHINES.

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RTB

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with the spelter coating that holds fast

GALVANIZED SHEETS

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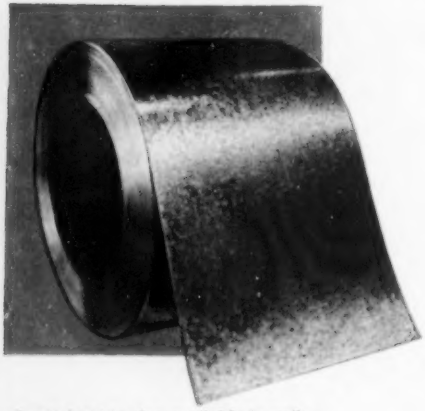
High resistance to corrosion



'Speltafast' is also available in coils, 2240 lbs. min.

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'Speltafast' is available in plain sheets up to 48" wide (depending on gauge), in gauges from 18 to 32, and in lengths from 36" to 144". Corrugated sheets are available in various profiles.

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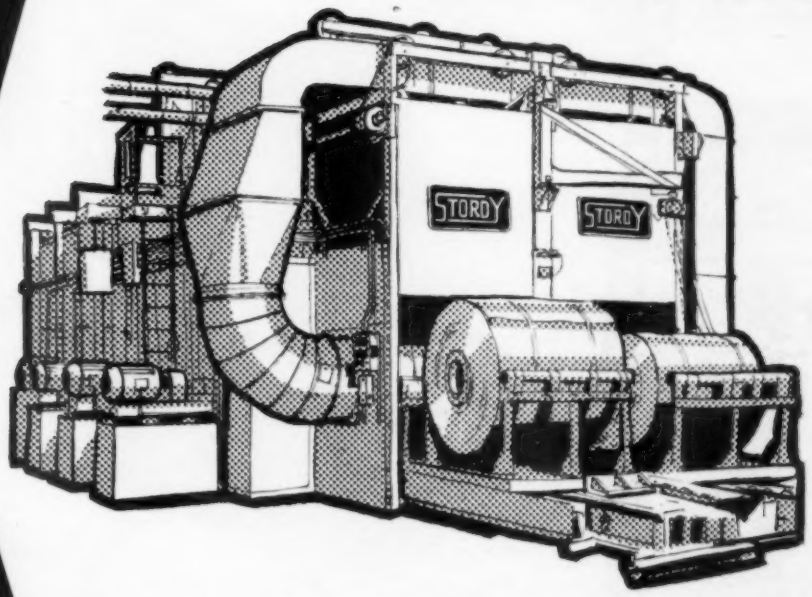
NEW STORDY FURNACE

considerably reduces annealing costs



An important feature of this new furnace is the regenerative heating system accomplished by the annealed coils passing through successive separate chambers closed by doors and also containing ingoing coils. The coils being cooled preheat the ingoing coils, thus reducing fuel cost per ton of metal heat treated with resulting significant increase in overall thermal efficiency.

The furnace is rated at 550 kW. with a capacity of 8,000 lb. per hour.
The furnace will hold 12 coils of 8,000 lb. each when operating on a continuous cycle.

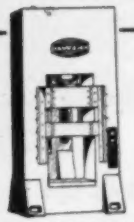
STORDY ENGINEERING LIMITED

CUMBRIA HOUSE · GOLDTHORN HILL · WOLVERHAMPTON

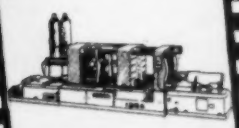
Editorial Contents. page 397 **Classified Advertisement pages. 123**

Reduce floor space, manpower and production costs with IWK Transfer presses

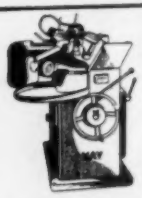
WE ALSO SUPPLY



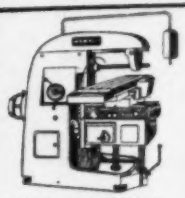
IWK HYDRAULIC PRESSES



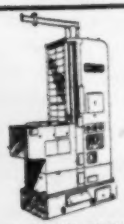
IDRA
DIE CASTING MACHINES



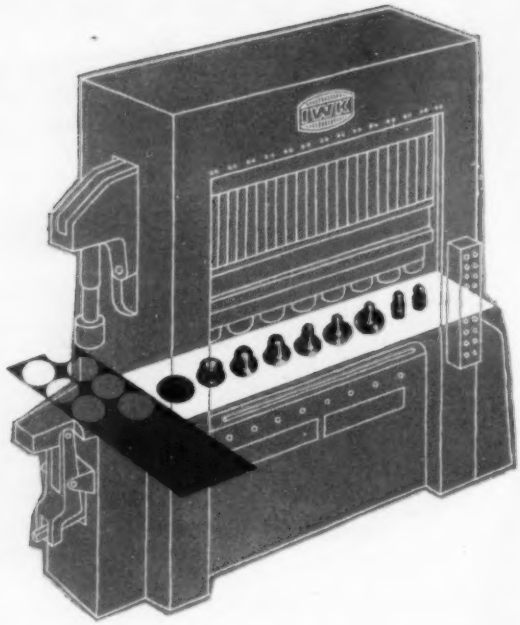
MAY TWIST DRILL GRINDER



MAMMUT MILLING
MACHINES



K. KLINK BROACHING
MACHINES



These fully proven machines eliminate inter-stage annealing and combine, in one machine, operations normally carried out on several single-stage presses. The exclusive IWK quick tool-changing device reduces change-over times to two hours.

Please submit samples or drawings for a detailed production proposition or request our press specialist to call.

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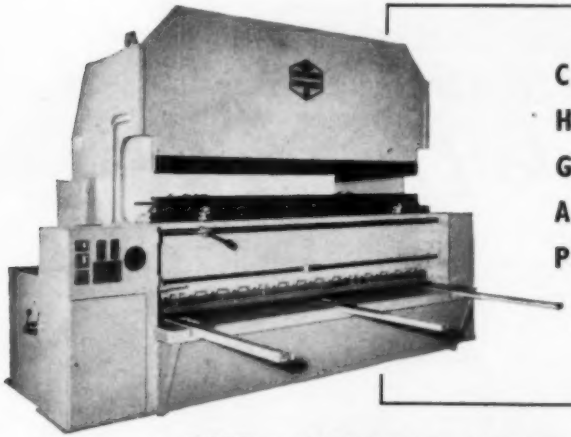
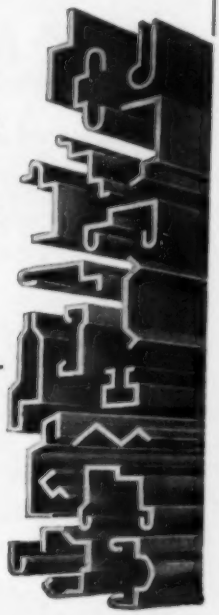
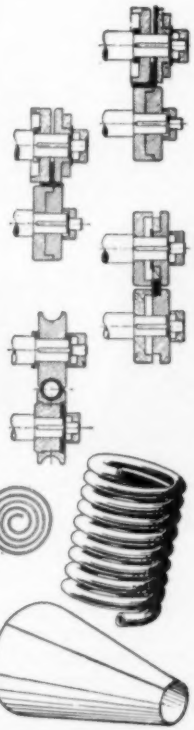


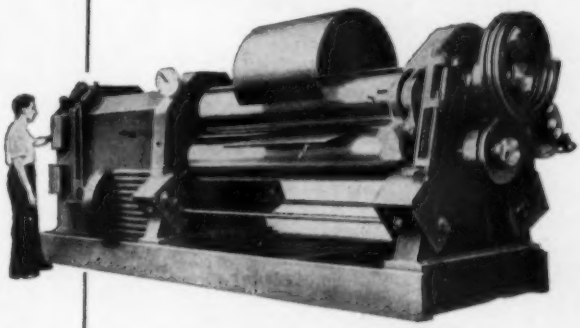
COMBINED HYDRAULIC GUILLOTINE AND PRESSBRAKE



THE WORLD'S MOST MODERN SHEET METAL AND PLATE WORKING MACHINERY



COMBINED PLATE AND SECTION BENDING ROLL OF INITIAL PINCH TYPE



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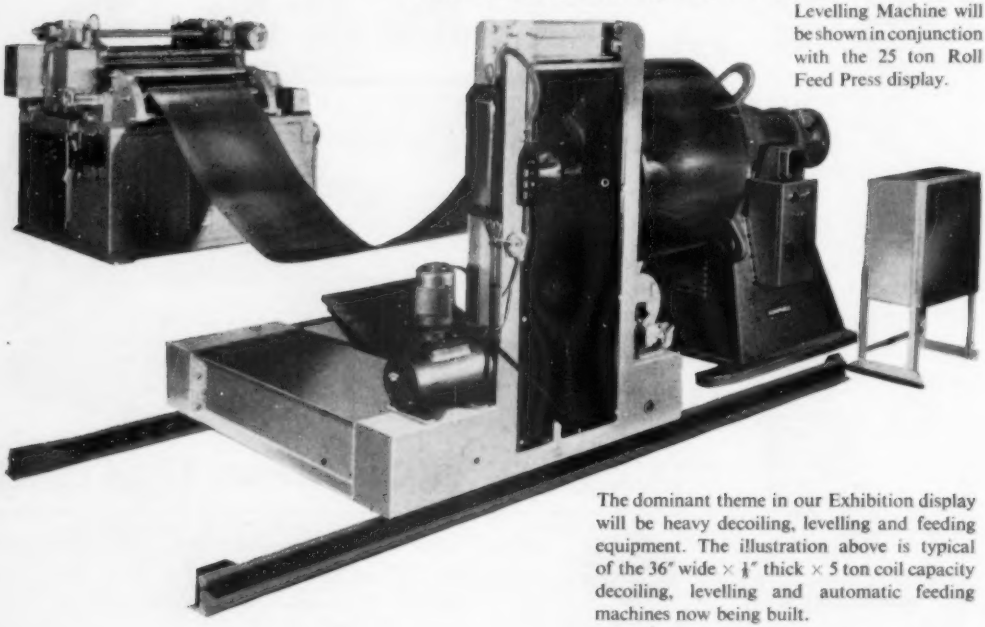
just illustrations here but...

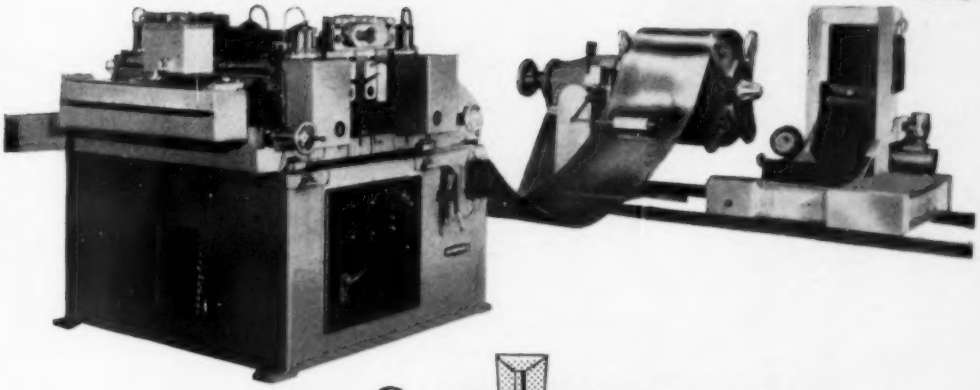
Two HUMPHRIS Presses will be on display, a new version of our well known 10 ton Endwheel Press with increased stroke and greater tool space, and an entirely new version of our 25 ton Friction Clutch Automatic Roll Feed Press.

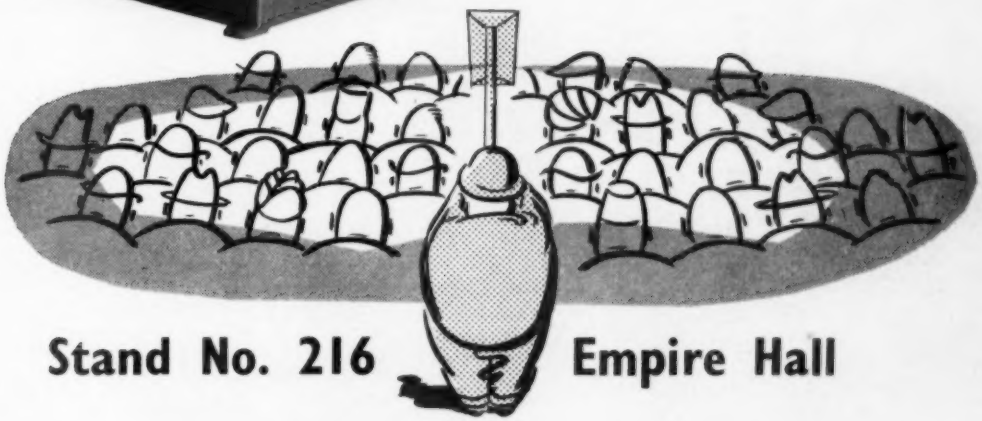
As a typical example of the HUMPHRIS Cradle type Decoiling Machines, a Model CD.1000B Mark II Combined Decoiling and Levelling Machine will be shown in conjunction with the 25 ton Roll Feed Press display.



The dominant theme in our Exhibition display will be heavy decoiling, levelling and feeding equipment. The illustration above is typical of the 36" wide × ¼" thick × 5 ton coil capacity decoiling, levelling and automatic feeding machines now being built.

See them working at the I.M.T.E.





Stand No. 216 Empire Hall

Undoubtedly the novelty of our display will command a crowd but we wouldn't dream of keeping you at periscope distance from our exhibits. On the contrary, we may even invite you to handle a control or two. Make a point, therefore, of coming along to Stand 216 if you are in any way concerned with the processing of sheet metal.

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HUMPHRIS

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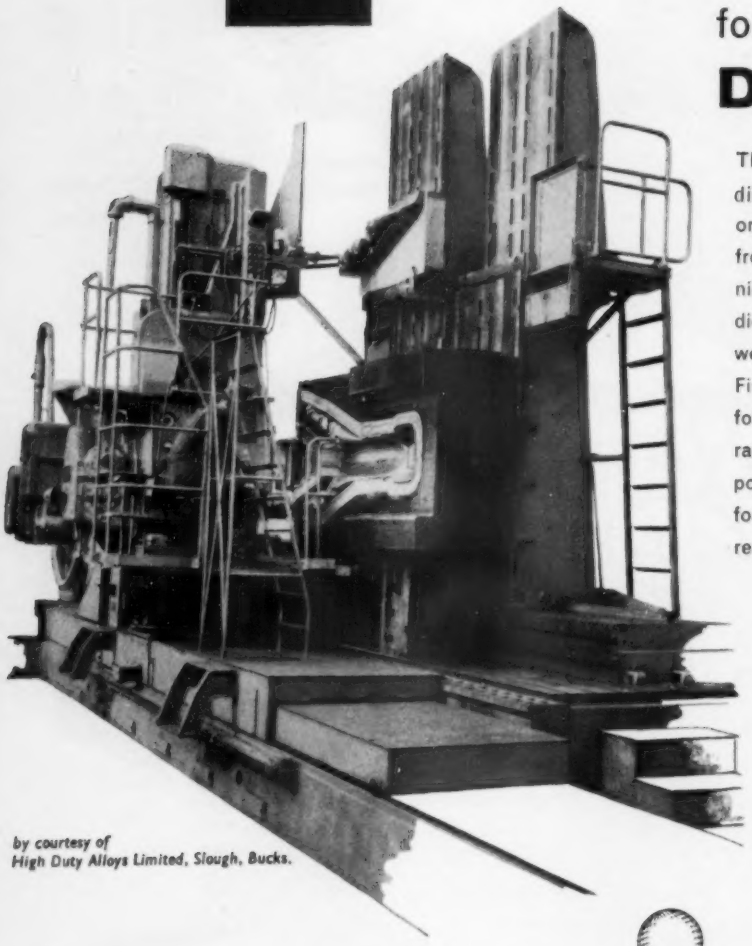
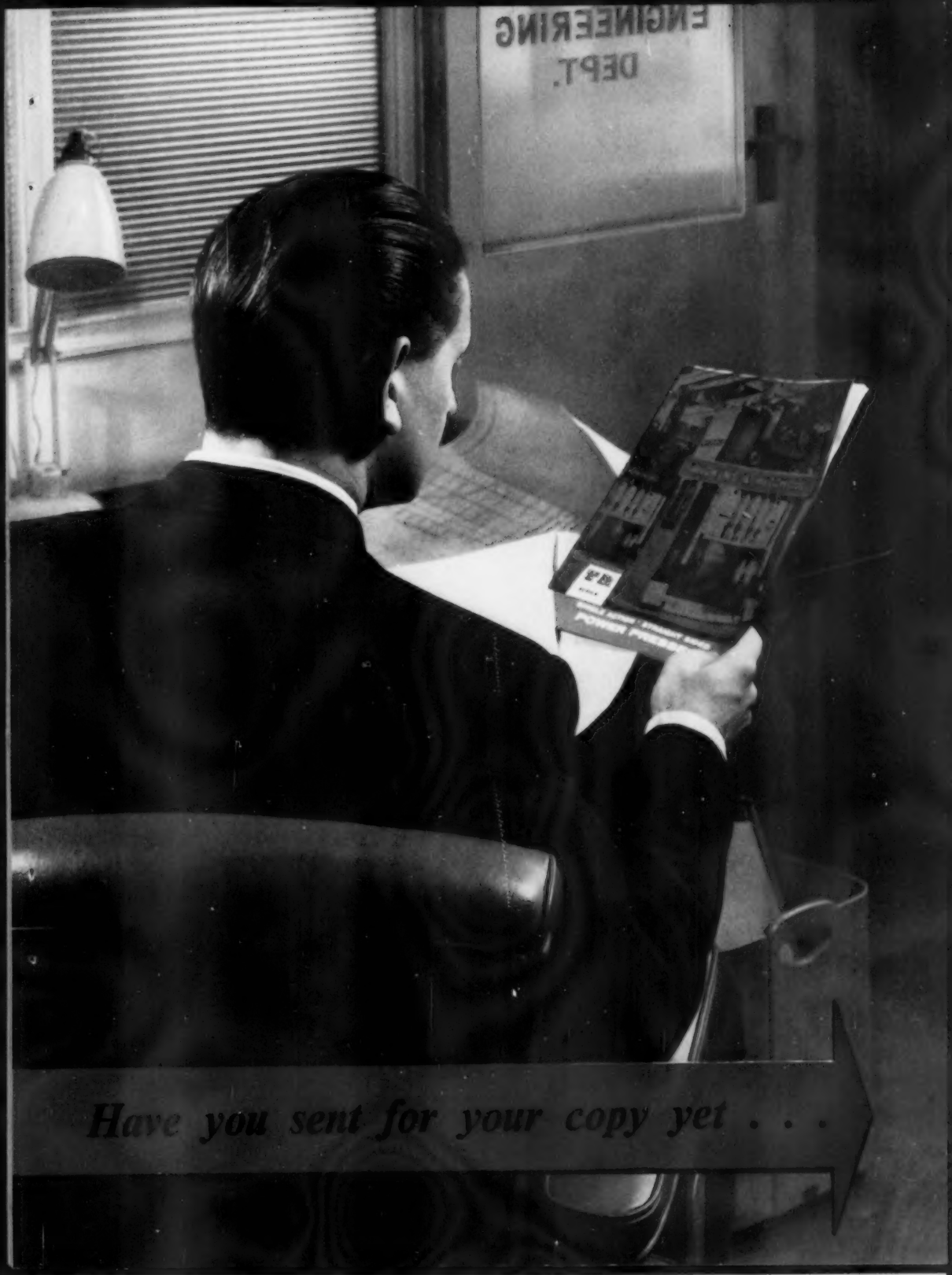


by courtesy of
High Duty Alloys Limited, Slough, Bucks.

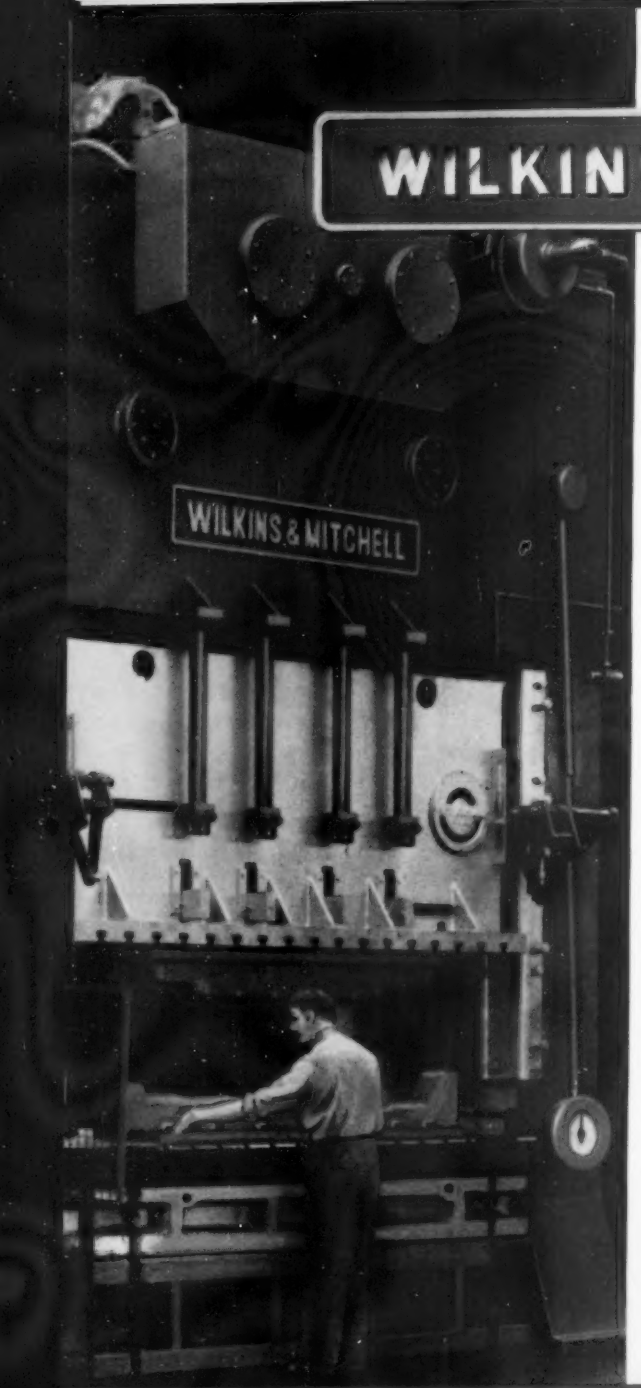
The value of the finished dies being cut for use on this machine may be gauged from the fact that the Firth Brown nickel-chrome-molybdenum steel die-blocks have an unmachined weight of 43 tons.
Firth Brown die-blocks forged from special alloy steels range in size from a few pounds weight for small dies for plastics to the really large dies shown here.

FIRTH BROWN

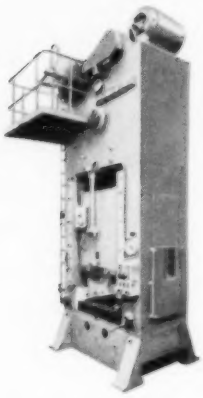
ALLOY STEELMAKERS · FORGEMASTERS · STEEL FOUNDERS · HEAVY ENGINEERS
THOS. FIRTH & JOHN BROWN LIMITED · SHEFFIELD · ENGLAND


ENGINEERING
DEPT.
Have you sent for your copy yet . . .

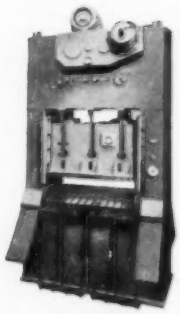
WILKINS & MITCHELL



STRAIGHT-SIDED SINGLE-ACTION T.R. SERIES POWER PRESSES 1, 2 and 4 POINT SUSPENSION



These many features, essential for greater productivity are embodied in this range of Wilkins & Mitchell Power Presses —the presses that cut costs . . .



- HIGH TORQUE CLUTCH
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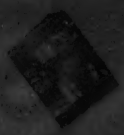
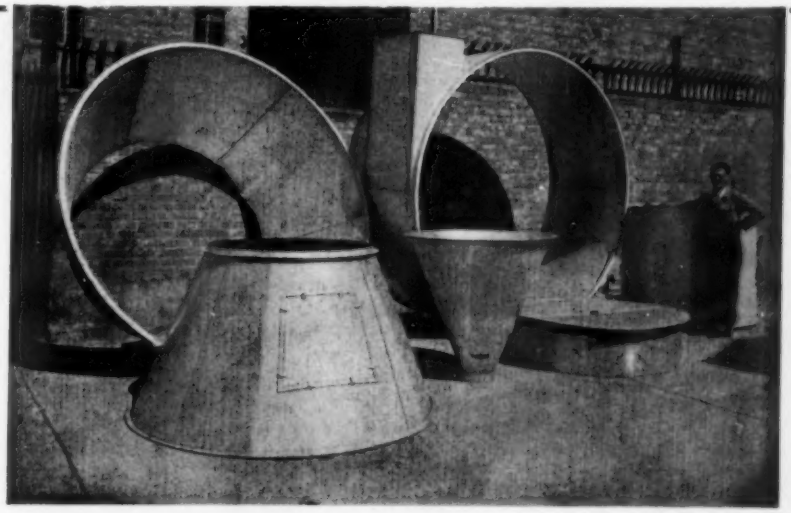


PLEASE SEND FOR THE 'TR' BOOK OF THE PRESSES THAT CUT COSTS

WILKINS & MITCHELL LTD.
Darlaston · S. Staffs.
London Office: 70 Park Lane, W.1



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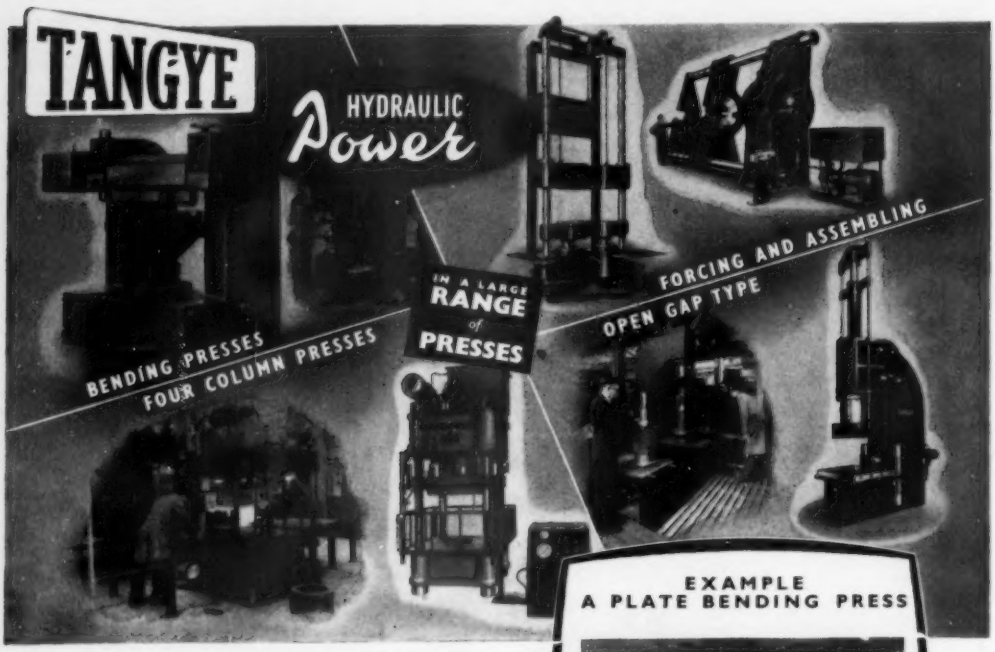
C·W·S

BIRTLEY TINPLATE WORKS

★ We shall be happy to receive your enquiries

C.W.S LTD., BIRTLEY, Co. DURHAM

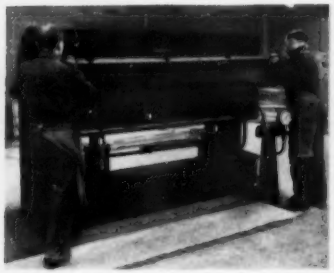


The convenience and simplicity of CONTROLLED HYDRAULIC PRESSURE harnessing almost limitless power, lends itself to many applications and proves to be an increasing influence on the pattern of modern engineering design.

The examples we show of presses are only a small selection but enquiries for equipment covering any application of hydraulics receive careful consideration by the Hydraulic Division designers.

When heavy loads are to be moved or heavy pressures applied with precise control, Tangye Hydraulic equipment provides the necessary power.

EXAMPLE
A PLATE BENDING PRESS



This type of press can be supplied in any reasonable length and capacity. The illustration shows a 40 tons capacity press which is capable of bending ½" plate and accommodates six feet width. A single ram machine is supplied for plates up to 4' wide and additional rams are added to suit size and power required. The power required depends on the gauge of plate but also on the width of the 'V' opening on the bottom tool.

This example has a 3" daylight and tools and a 6" stroke. It is operated by a high-speed pump.

ASK FOR CATALOGUE No. 797

TANGYES LIMITED

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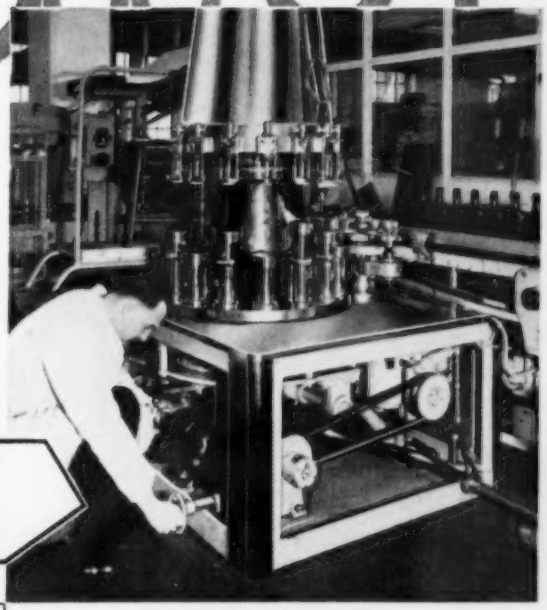
SLOW—QUICK—QUICK
SLOW

If product flow goes quick, quick slow—then what you need is variable speed. 2400 bottles for gin—Gordon's of course—reach this machine every hour, but there can be 3600. The gin is there, so the machine must bottle faster. How? Turn the handwheel and the Hainsworth pulley and V-belt move to the right speed position automatically. Faster—slower—every few minutes if needed. Bottling, spinning, woodworking, packaging—give your production a tonic, and get the right speed for your need with . . .



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VARIABLE SPEED DRIVES

THE PULLEY
7 sizes available for drives up to 10 H.P.

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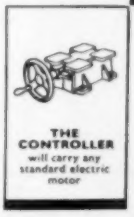
one of 35 sizes will suit your job



THE CONTROLLER
will carry any standard electric motor

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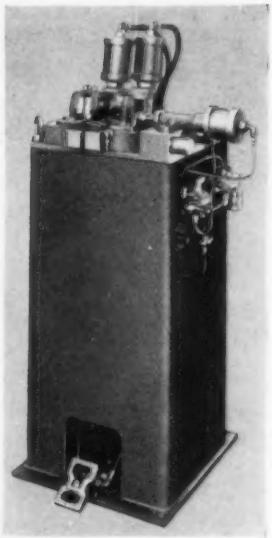

Slow Butt Welding Machine fitted with pneumatic tooling and combined spring pneumatic upset system for special applications also available with hand tooling and standard upset

15 KVA Single head Rivet Heating Machine available also with dual or triple head

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BRITISH FEDERAL WELDER & MACHINE CO. LTD.
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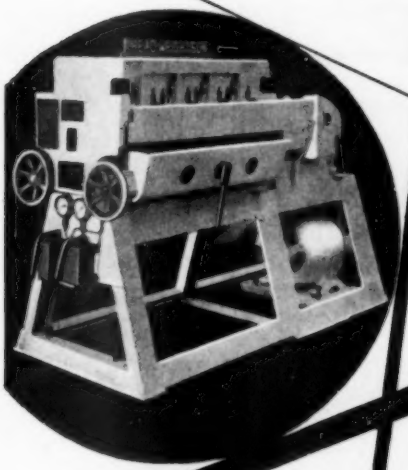
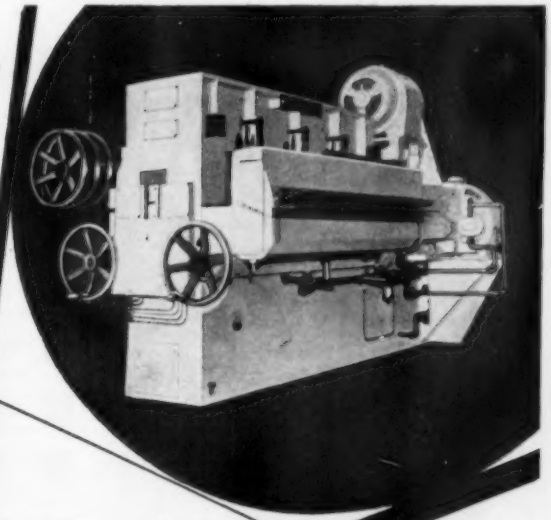
TELEPHONE DUDLEY 54701

aluminium foil or armour plate

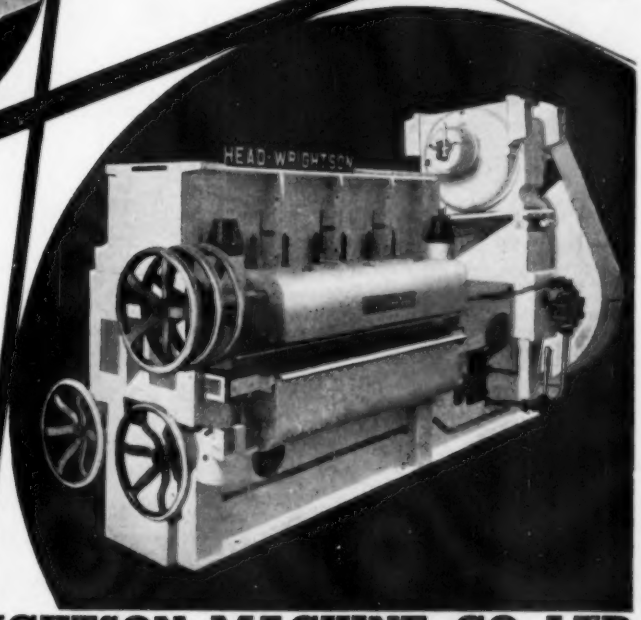
Left: 1¼" Pressure Regulating Roller Leveller





Top: 1¾" Processor Leveller

Bottom: 2½" Pressure Regulating Roller Leveller



The Head Wrightson Machine Company manufactures a very wide range of roller levellers for levelling from aluminium foil to heavy steel plates. Further information is available on request and our Sales Engineering Department will be pleased to give advice. For immediate service telephone Middlesbrough 43401.

THE HEAD WRIGHTSON MACHINE CO LTD

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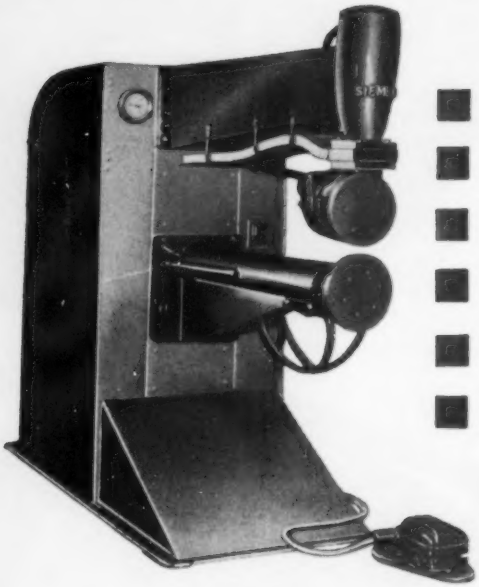
LONDON JOHANNESBURG SYDNEY and CALCUTTA

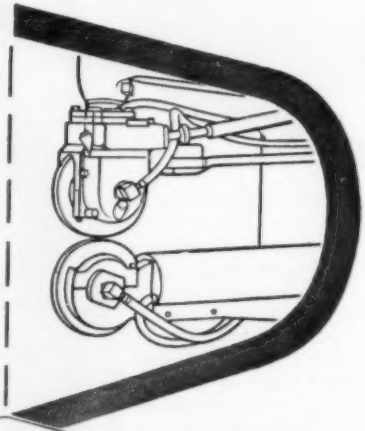
Modernise your workshop and reduce costs!

USE DUAL PURPOSE SEAM WELDERS



- All welded construction for strength and rigidity.
- Water-cooling throughout.
- All Electrode Bearings of Special Copper Alloy.
- Simple Layout of Transformer and ancillary apparatus for Easy Maintenance.
- Wide Range of Current and Pressure Adjustment with hand control.
- All Machines can be used with Modulators or with full Electronic Control.

One machine only required for long and end seams. To change-over, the upper electrode is merely turned through 90 deg. and the lower electrode holder replaced; the whole operation takes 20 minutes.



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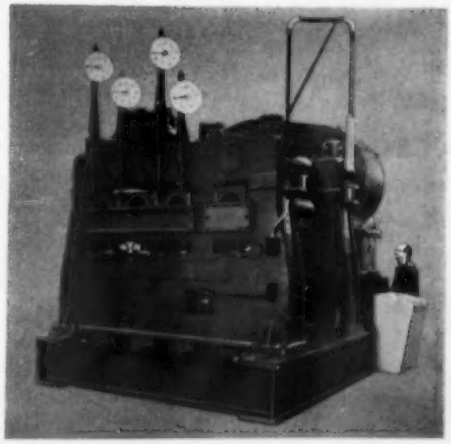
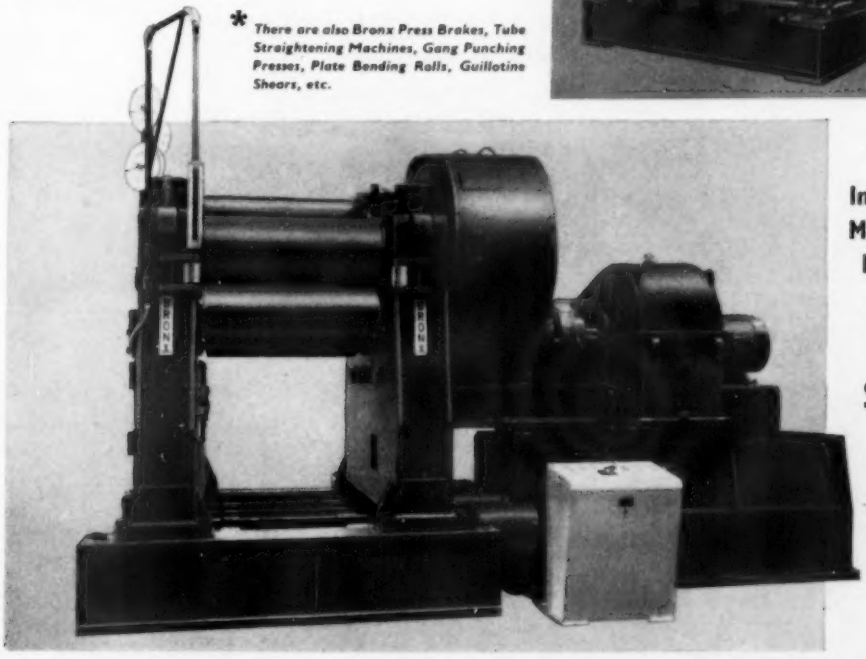
This BRONX Heavy Duty Plate Levelling and Edge Straightening Rolls will level plate to 36 in. wide x 3 in. thick and will edge straighten plates up to 36 in. wide x 2 in. thick. Edge straightening means taking the curve or bow out in the long way of the plate. This machine is installed at the largest bridge-building works in the world.

The greater part of the machine is installed below floor level to give a pass line height of 2 ft. 6 in. above floor level.



* *There are also Bronx Press Brakes, Tube Straightening Machines, Gang Punching Presses, Plate Bending Rolls, Guillotine Shears, etc.*



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STAND 107

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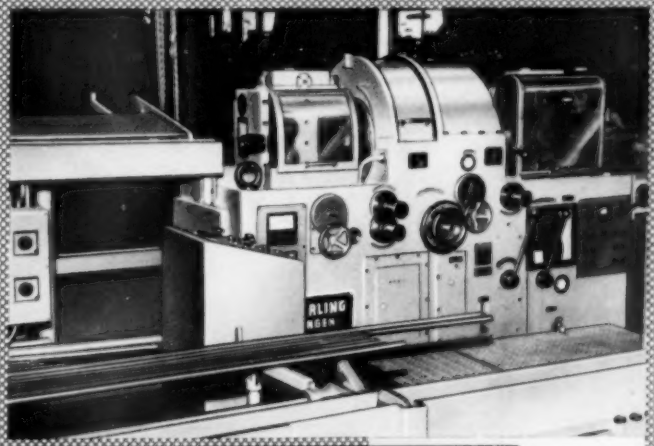

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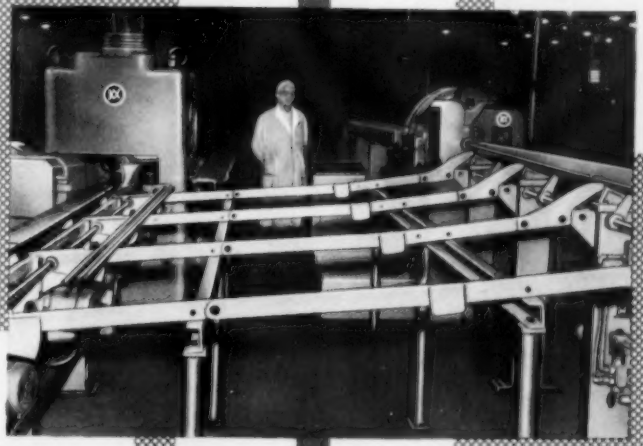

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Bars straightened from end to end.

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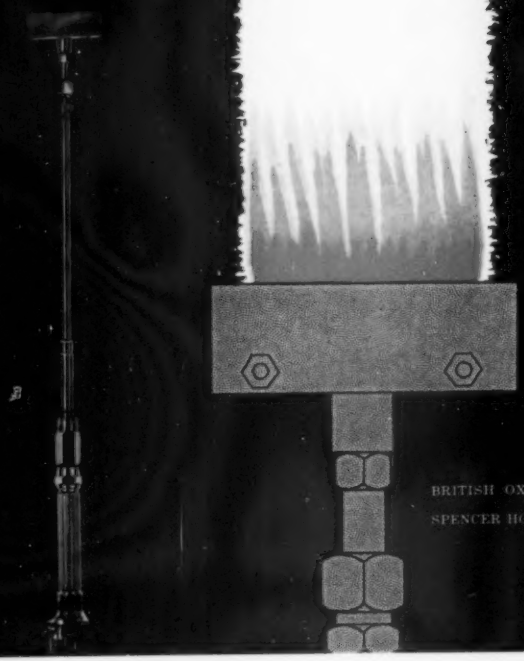

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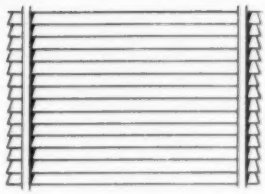

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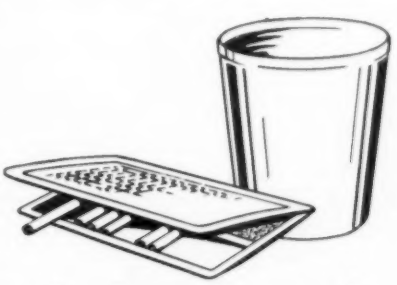

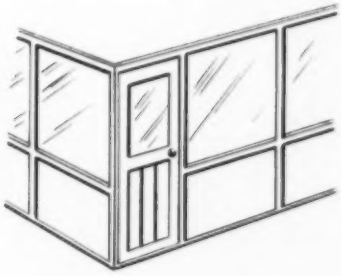

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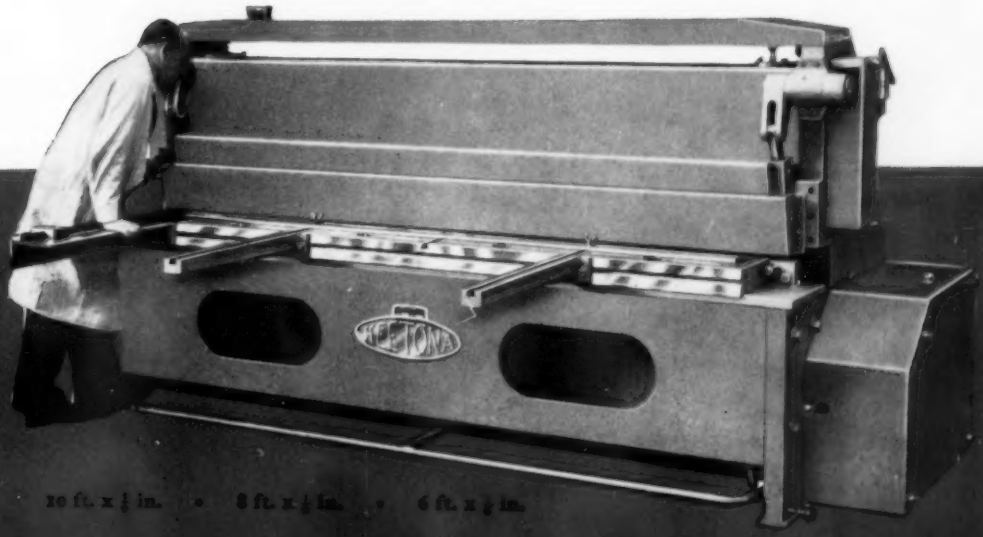

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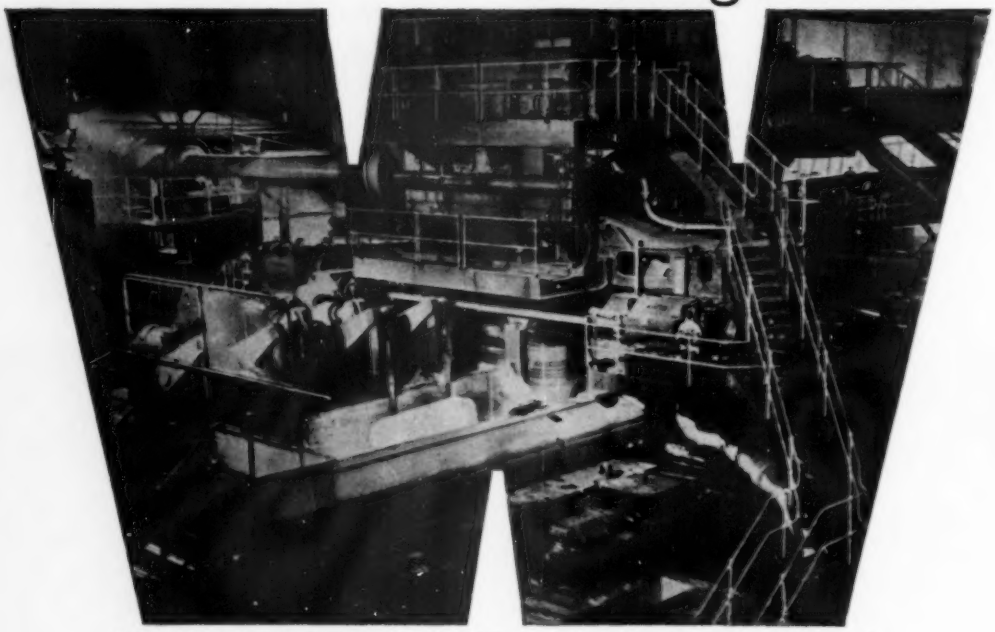

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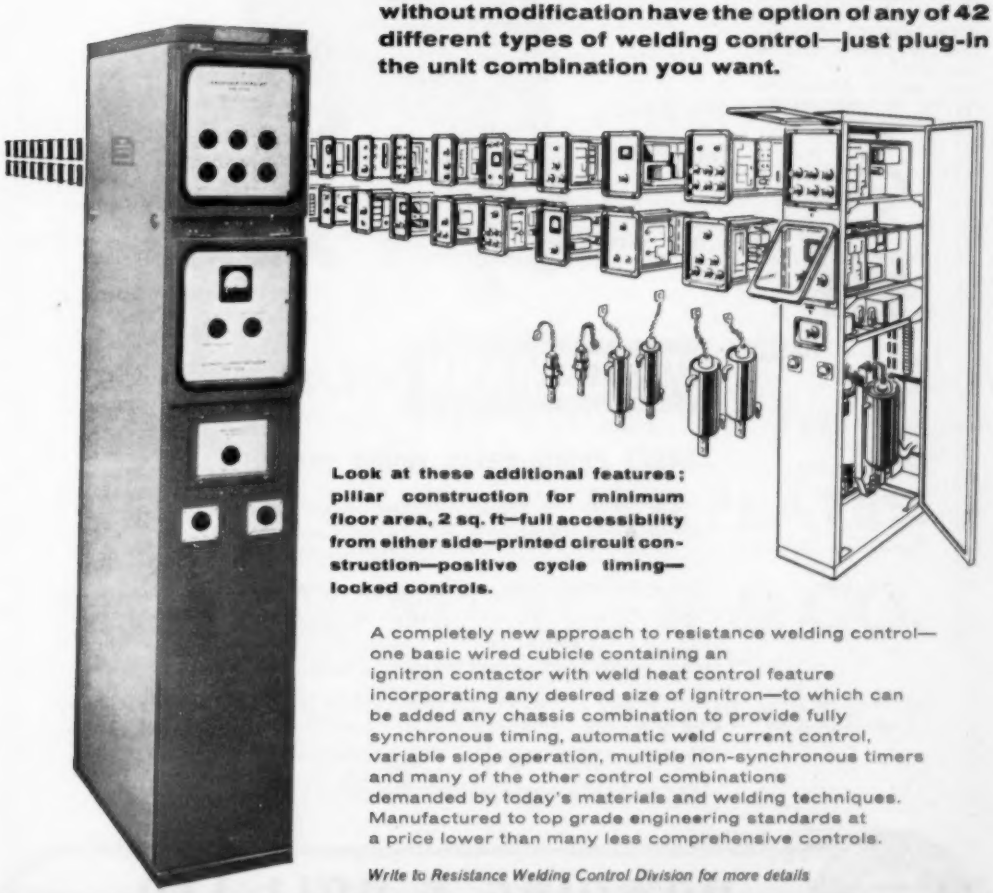

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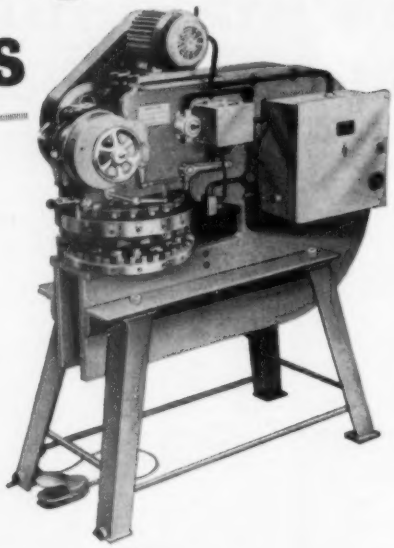

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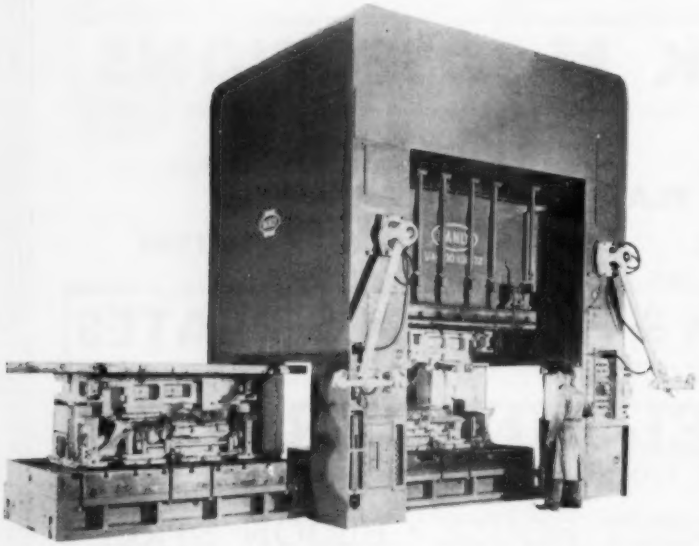
SINGLE ACTION FOUR POINT SUSPENSION UNDERDRIVE QUICK DIE CHANGE ECCENTRIC GEAR PRESS



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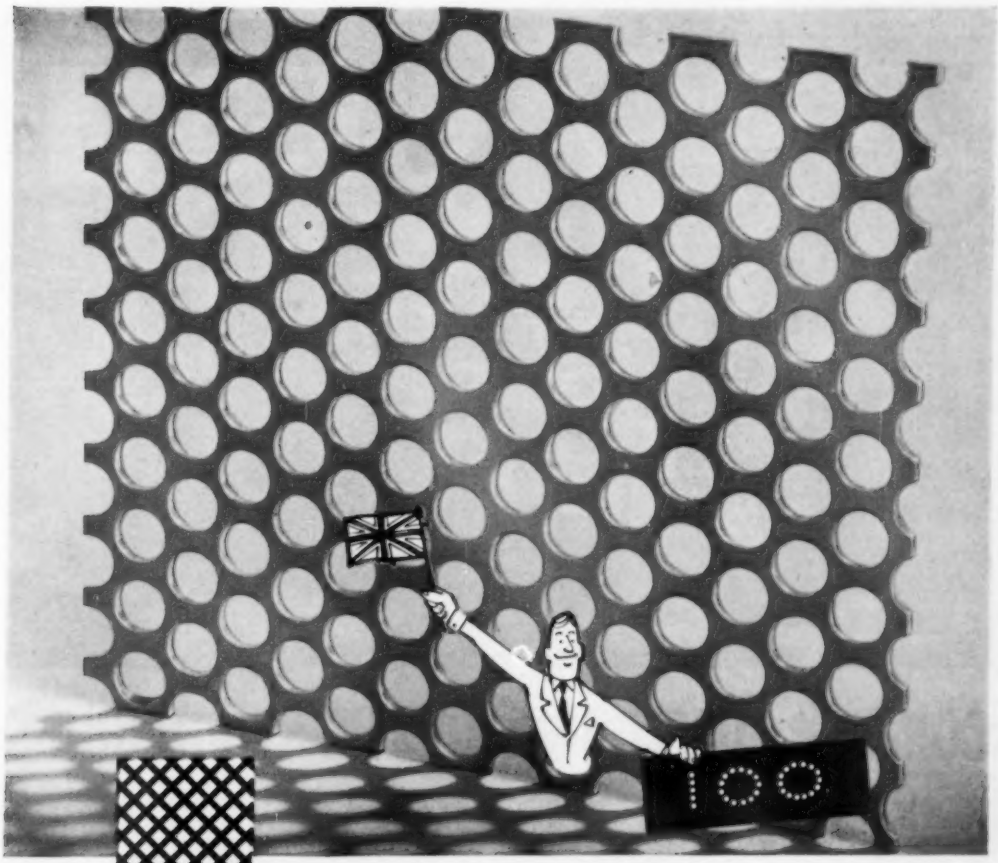

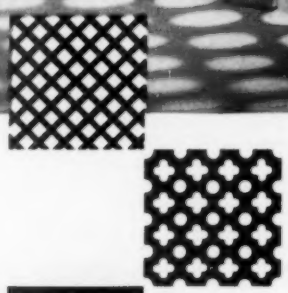

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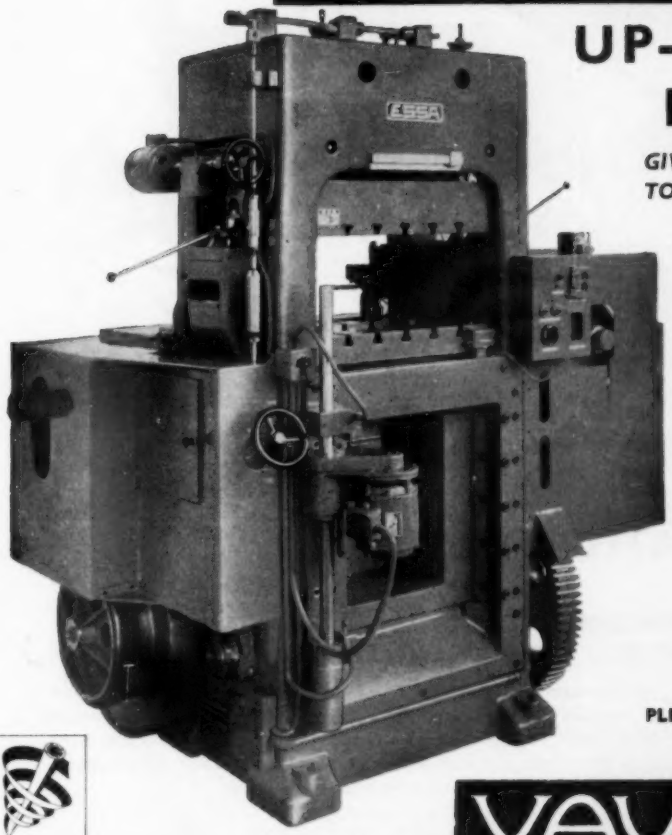

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PLUS GREATLY INCREASED PRODUCTION RATES ! ! !

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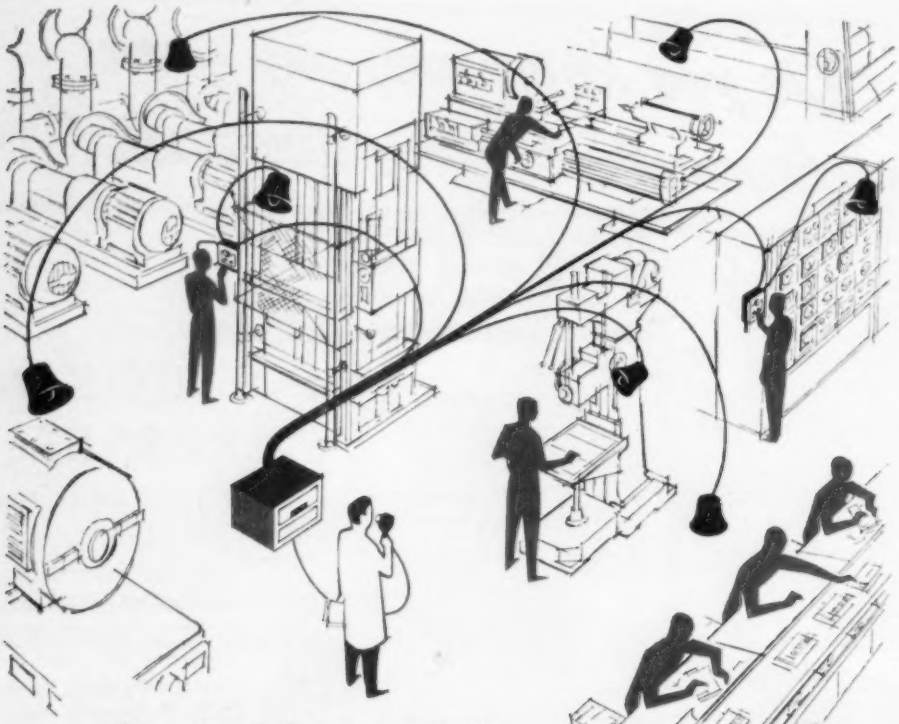

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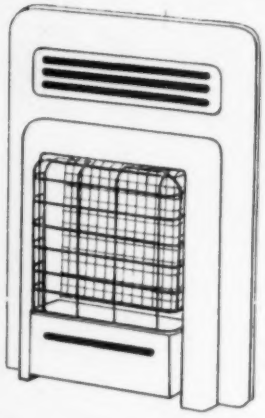

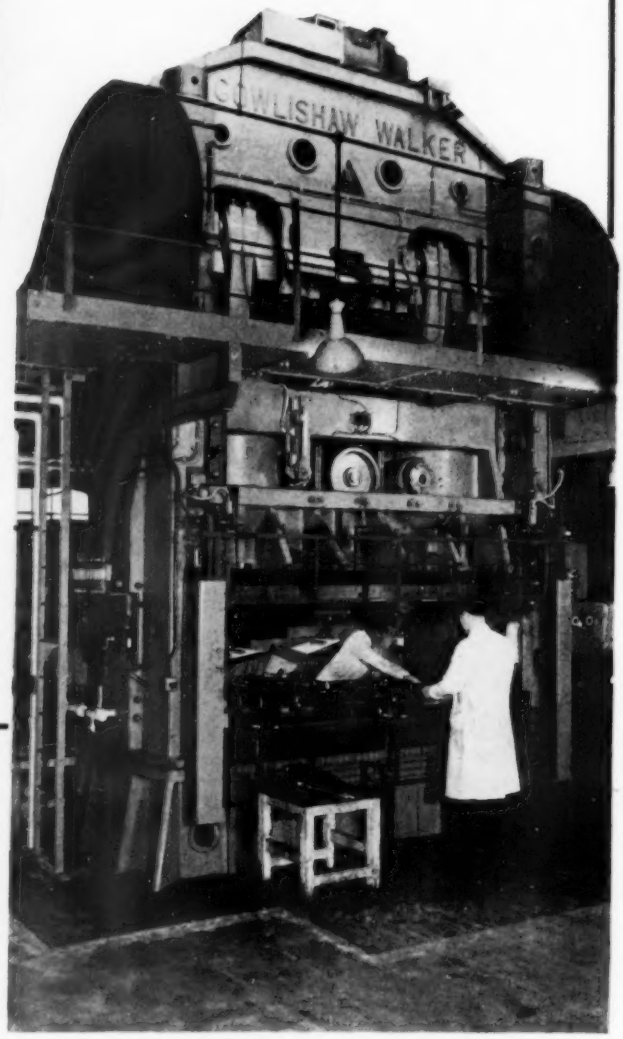

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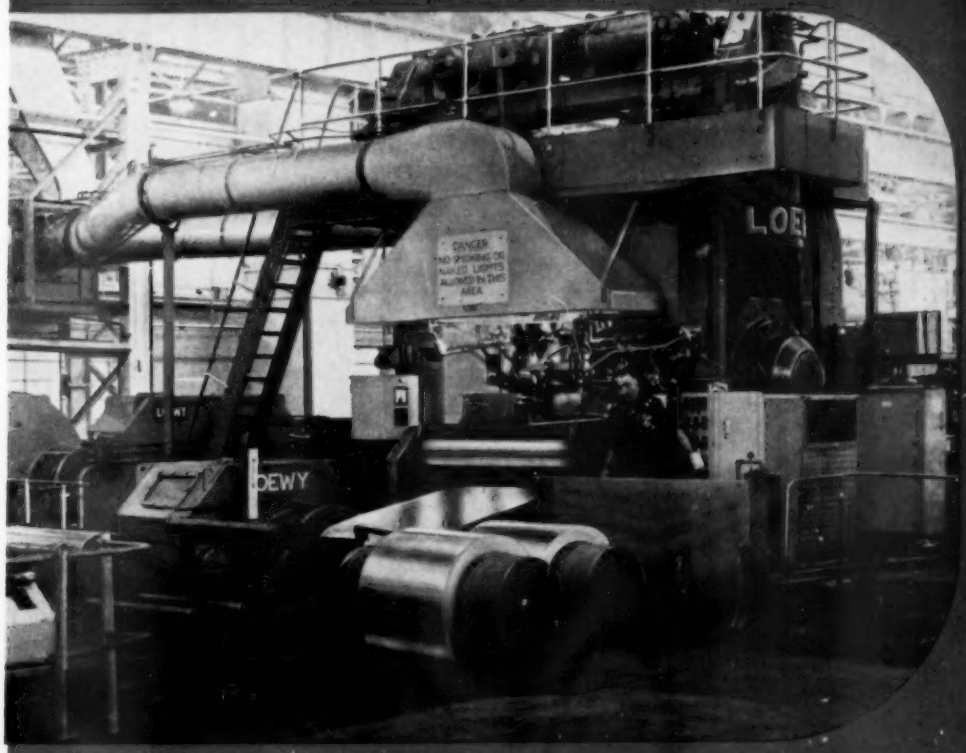

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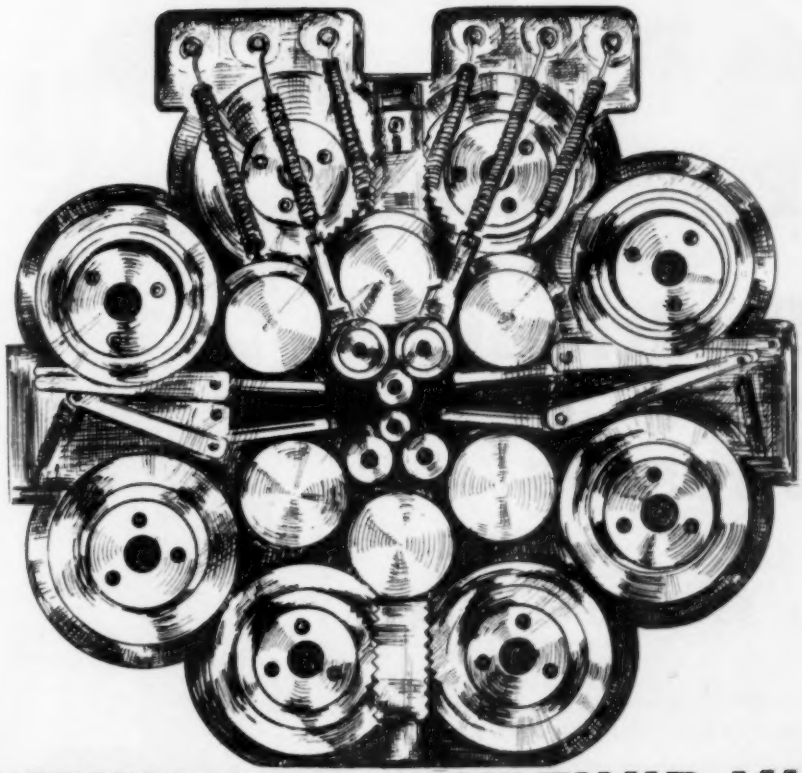

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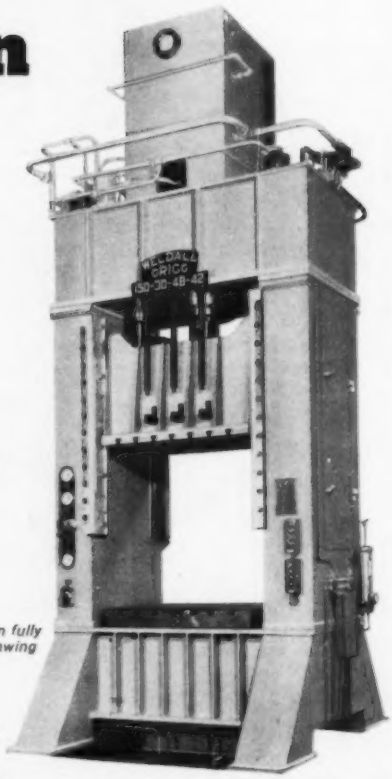

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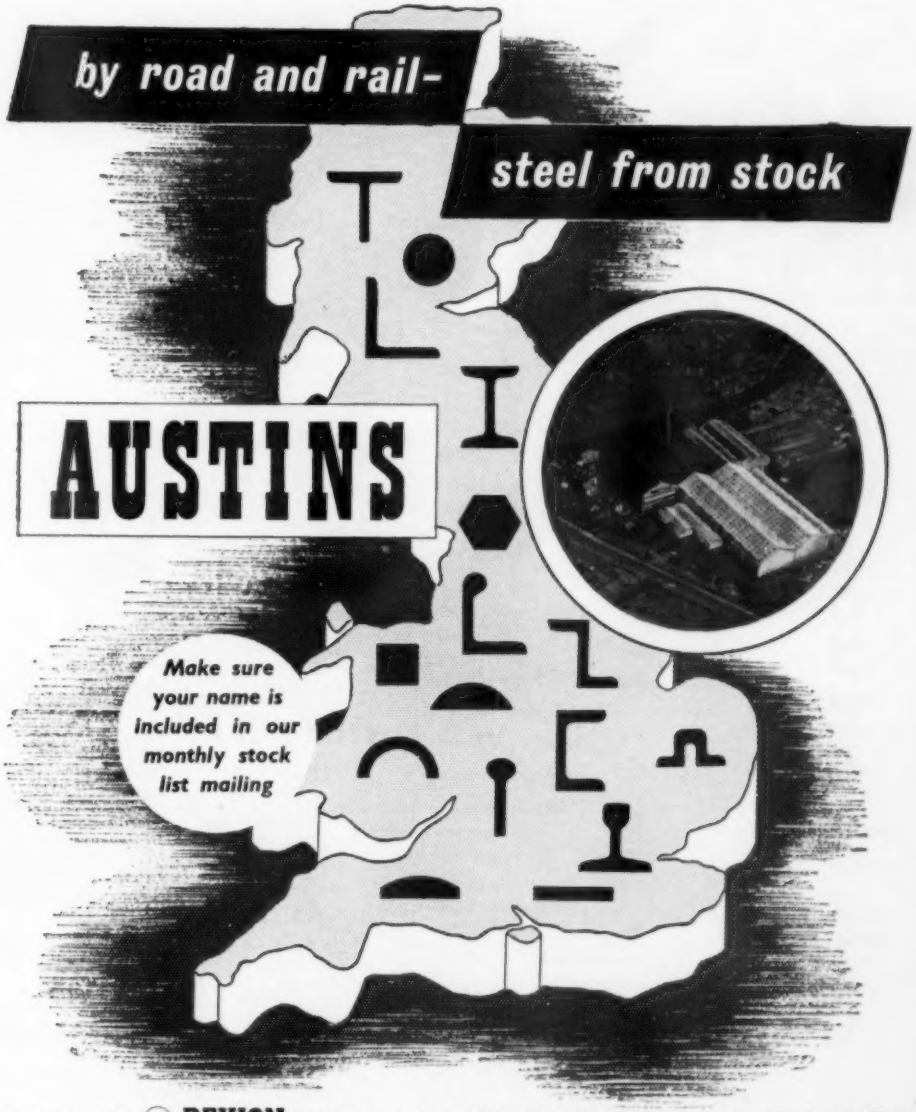

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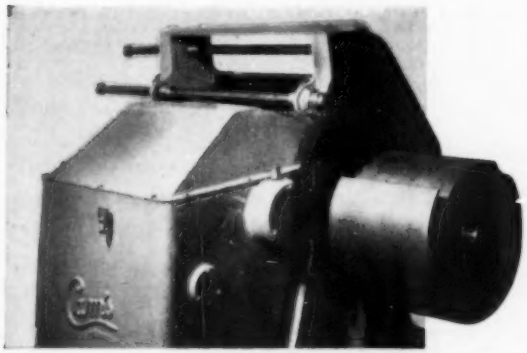

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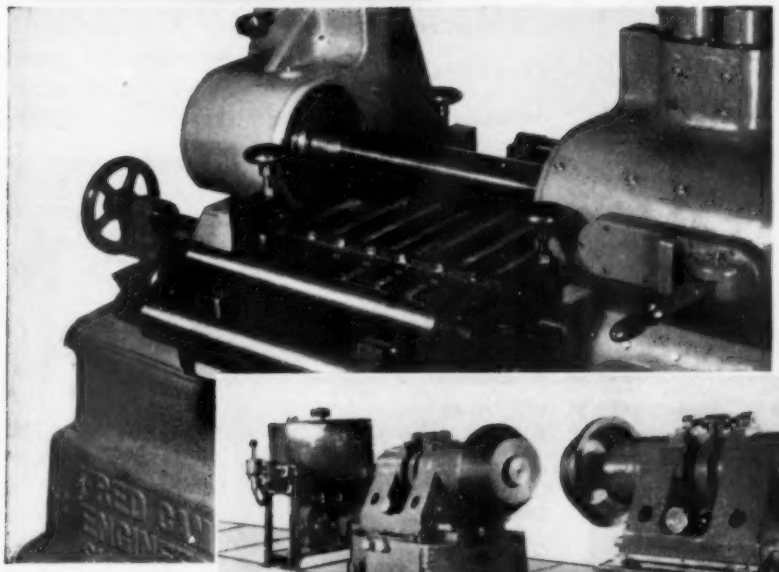

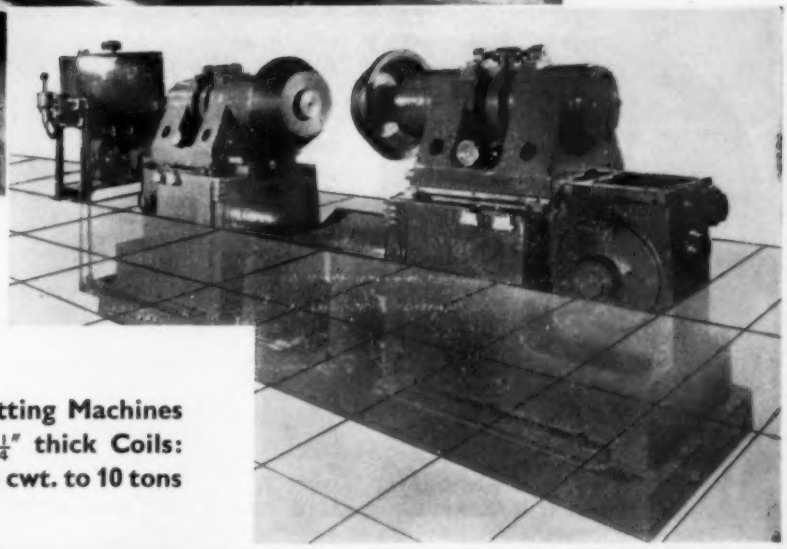

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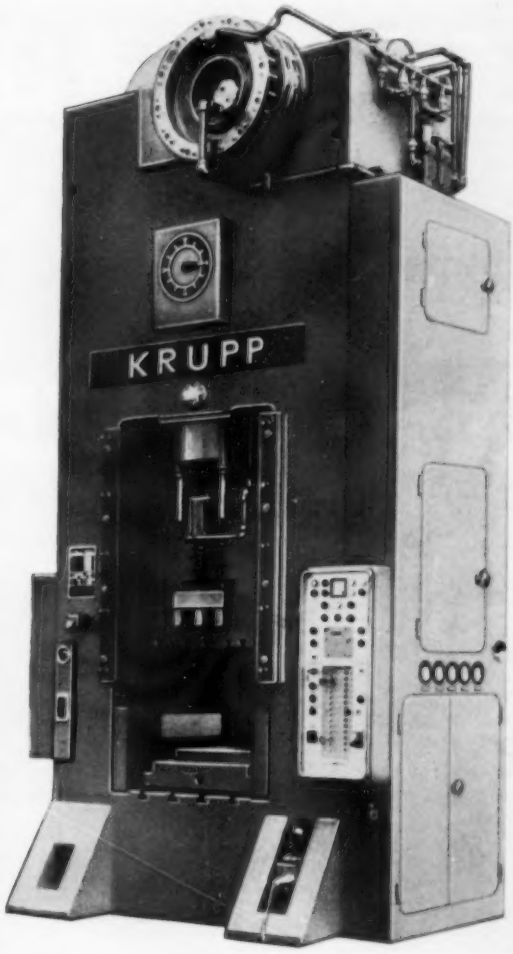

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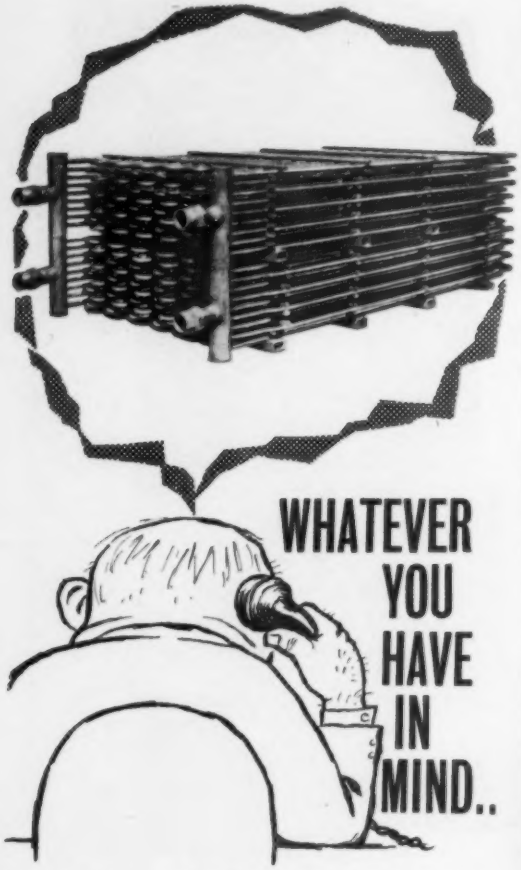

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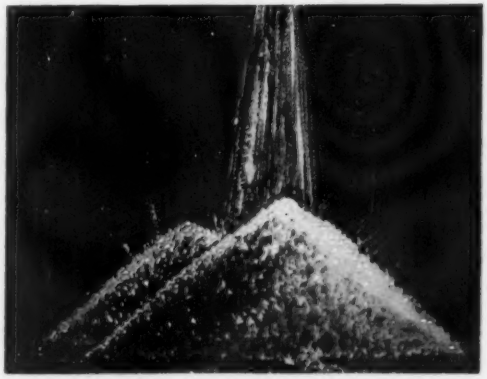

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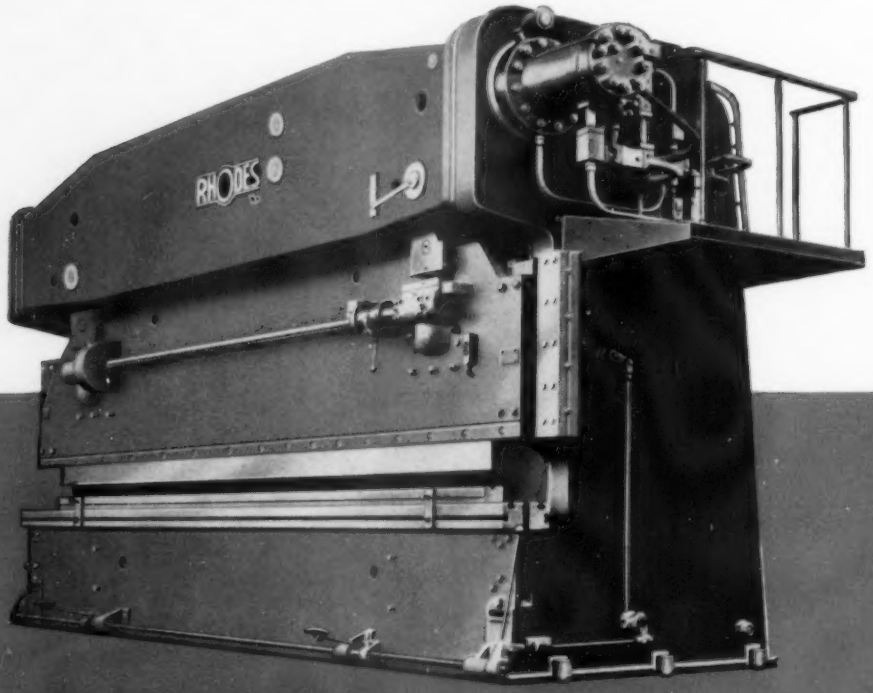

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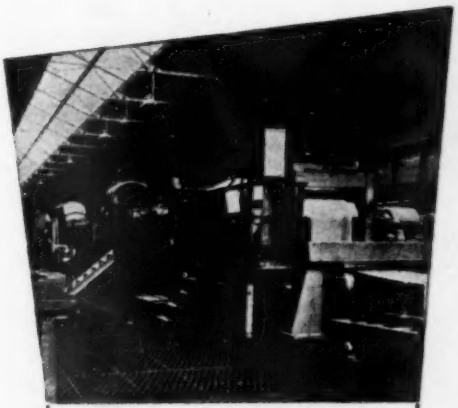

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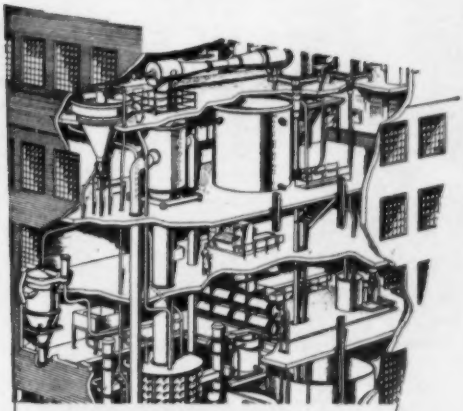

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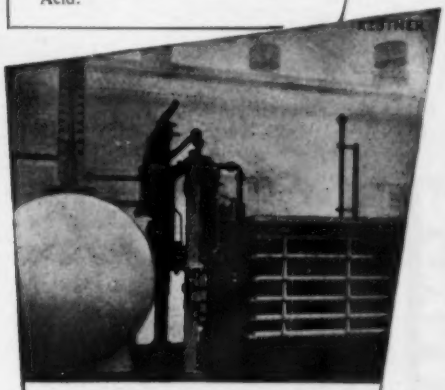

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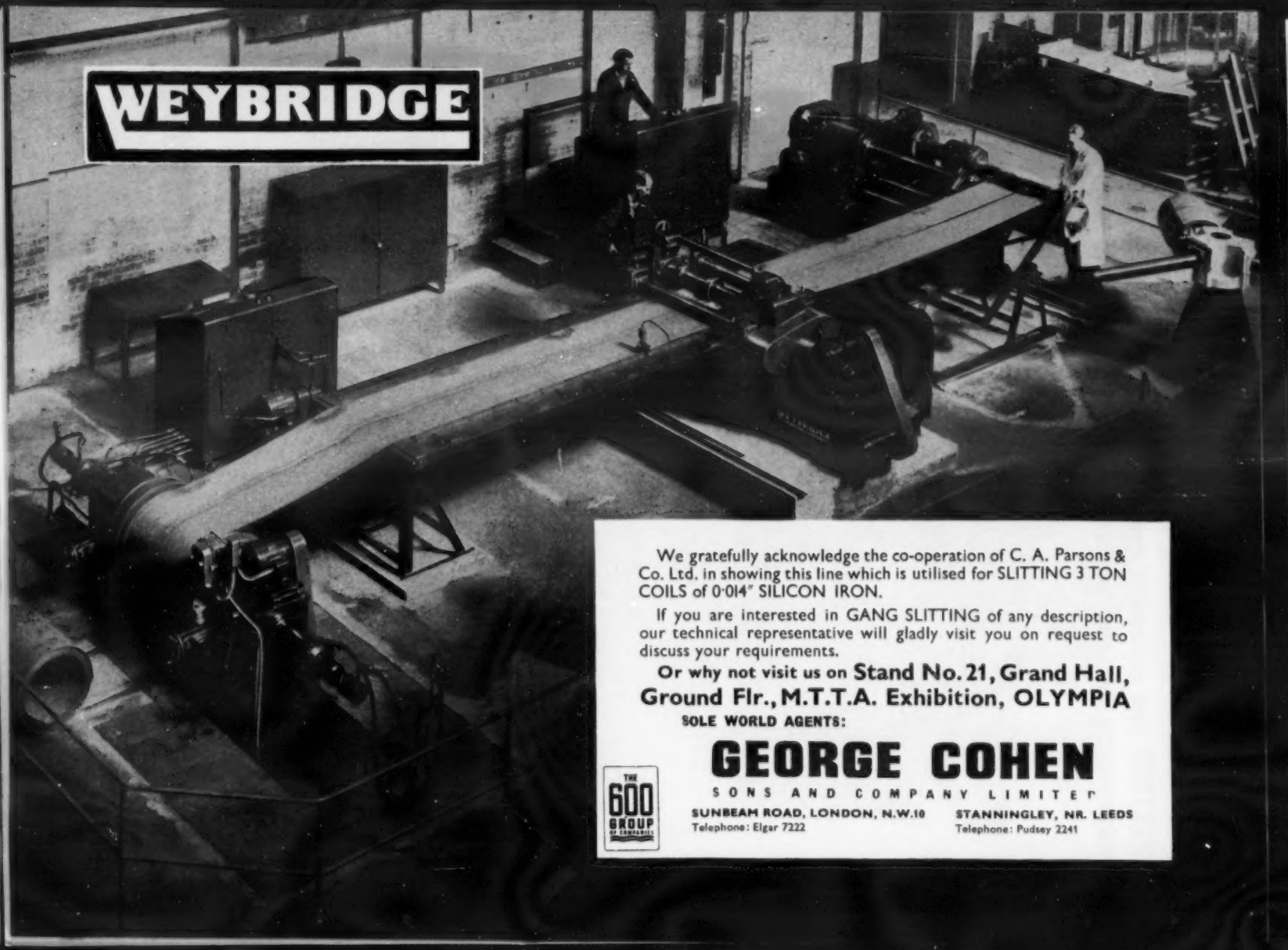

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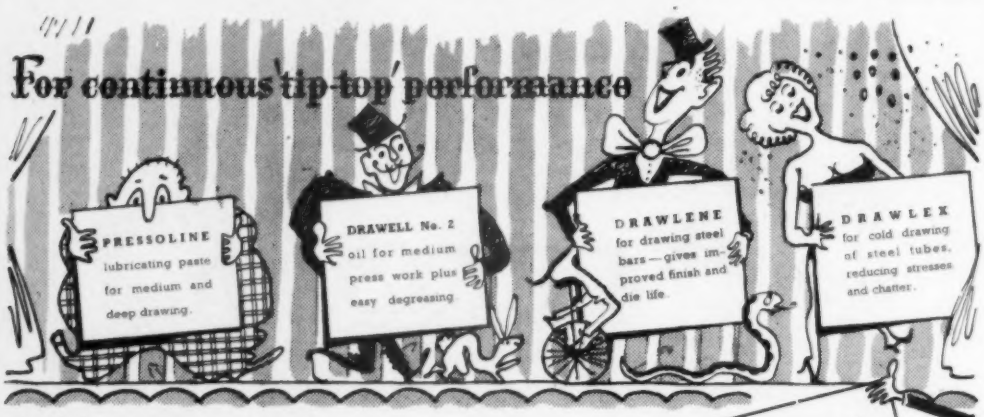
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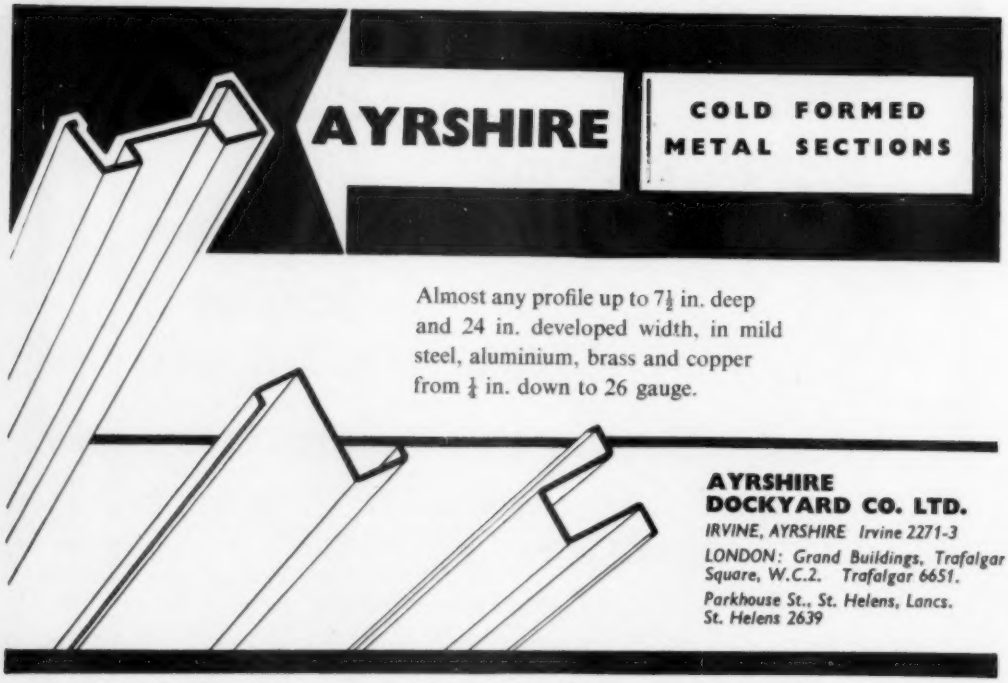
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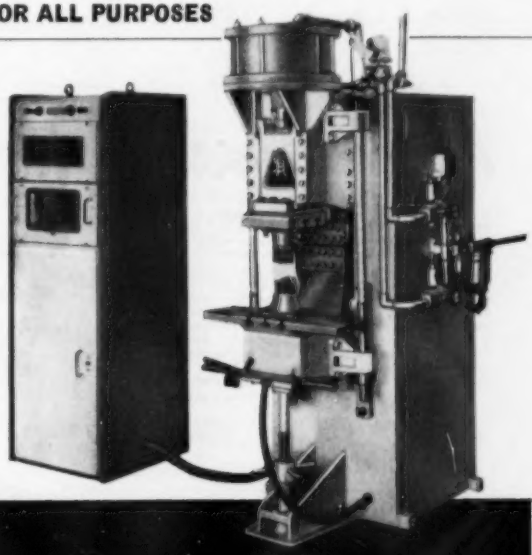

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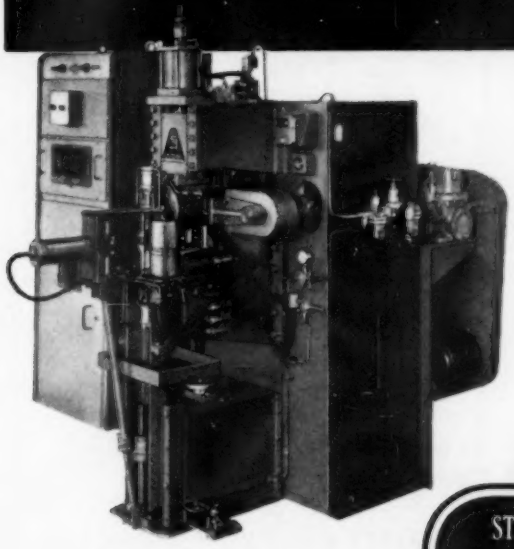

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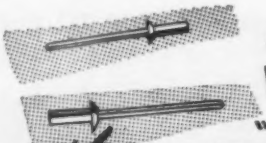

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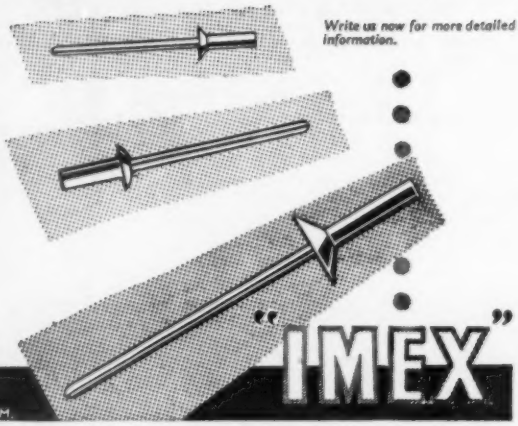

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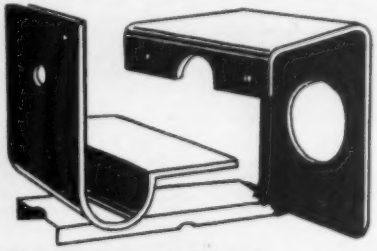

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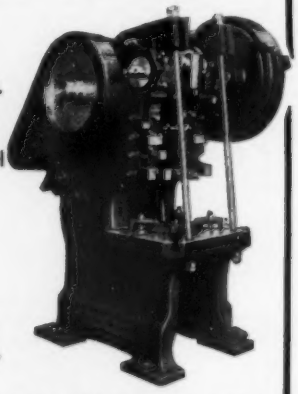

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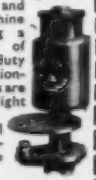

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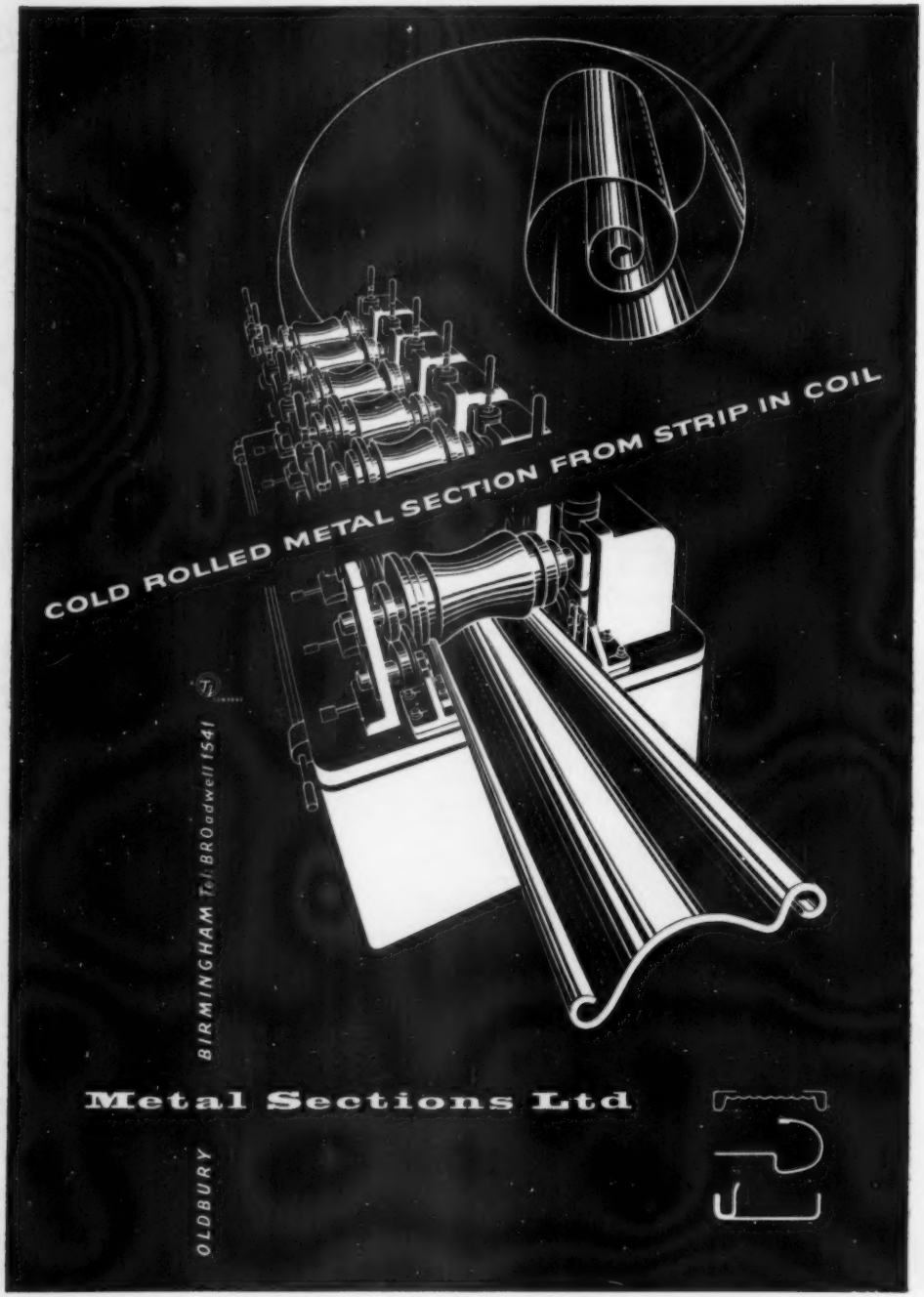
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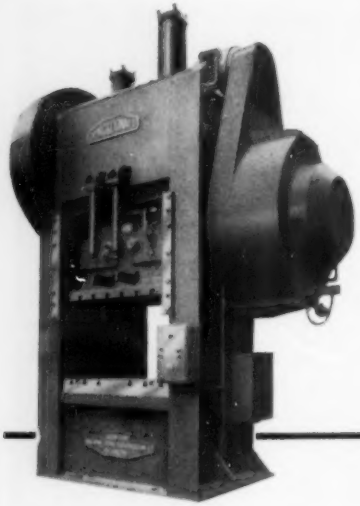

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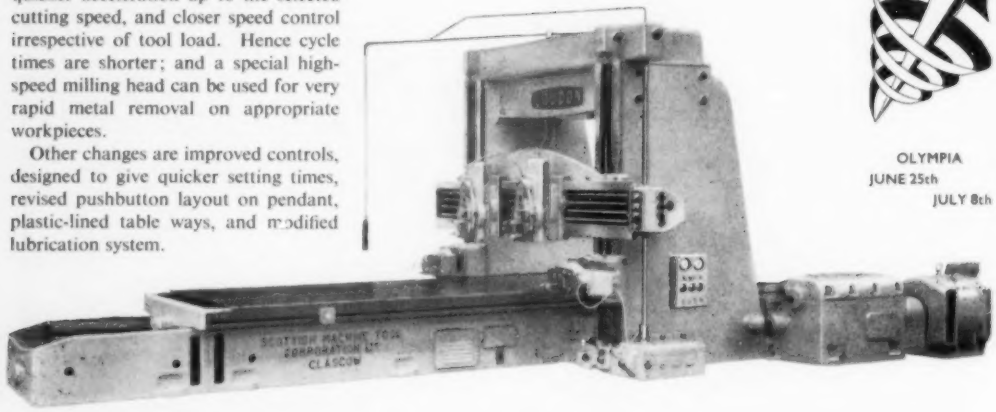

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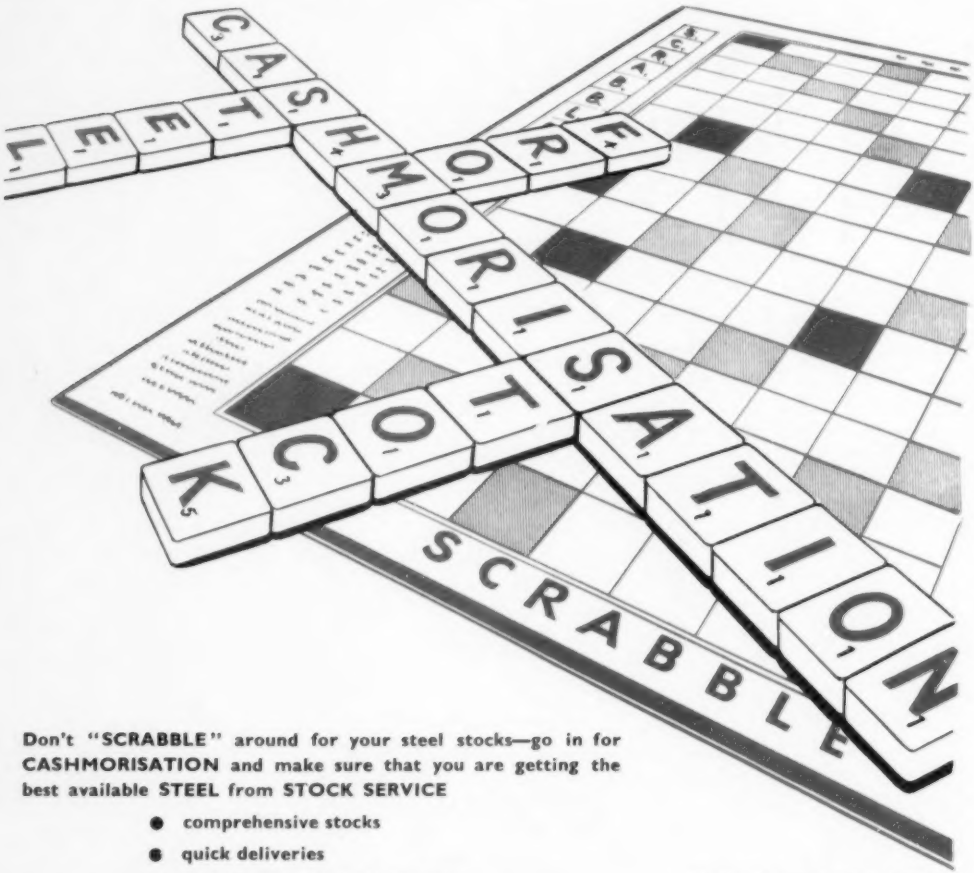

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For rolling all types of steel and non-ferrous metals up to 120 inches wide.

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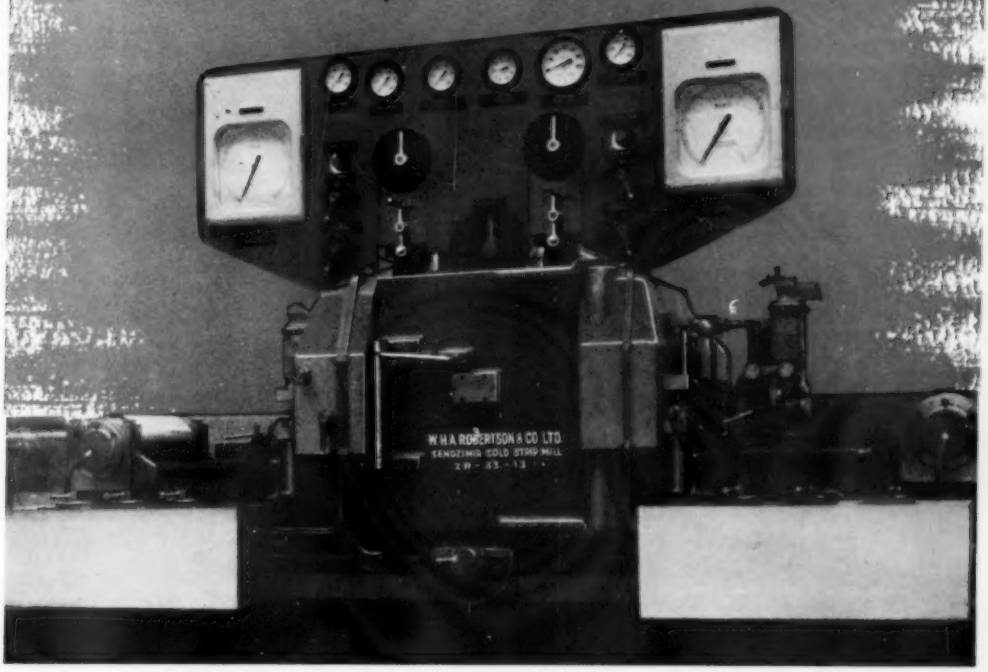

Illustrated is a Sendzimir Cold Strip Mill for rolling stainless steel.

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Licensees for the building of Sendzimir Cold Reduction Mills and Planetary Hot Mills, Halden Guillotine and Rotary Flying Shear Machines, and Torrington Metal Working Machinery.

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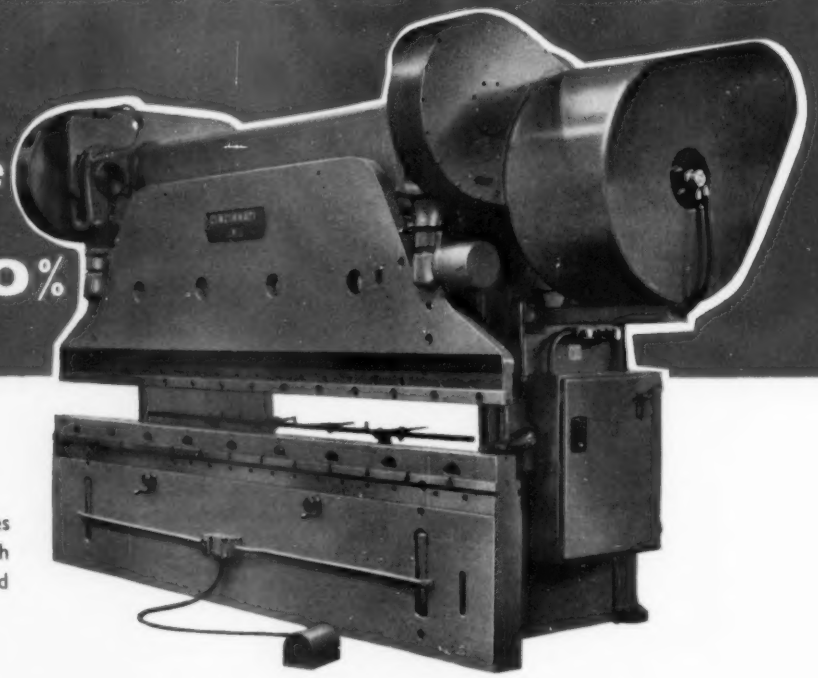
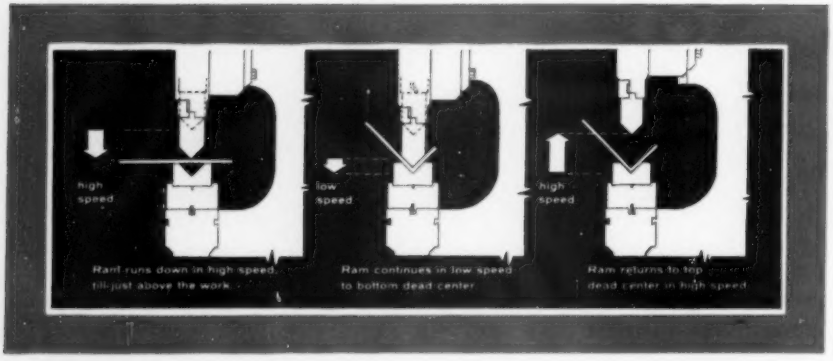
Increases Press Brake Production by up to 60%



Automatic Cycling advantages add up to faster output with reduced operator fatigue and far fewer rejects.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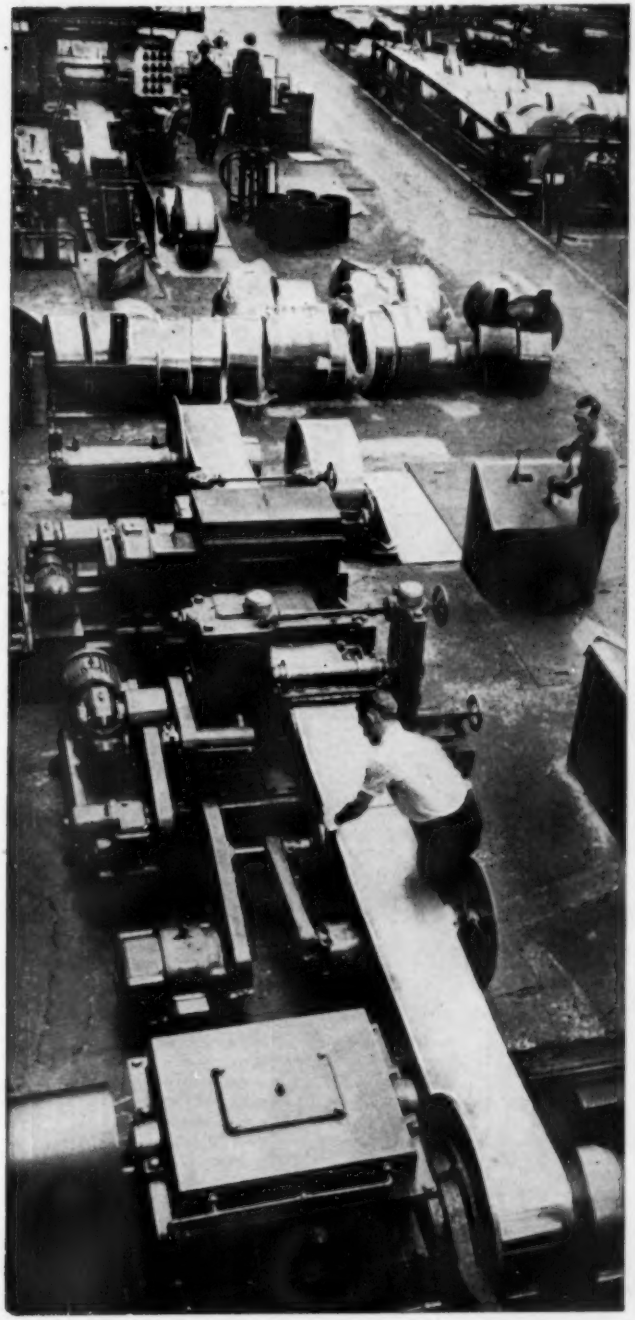

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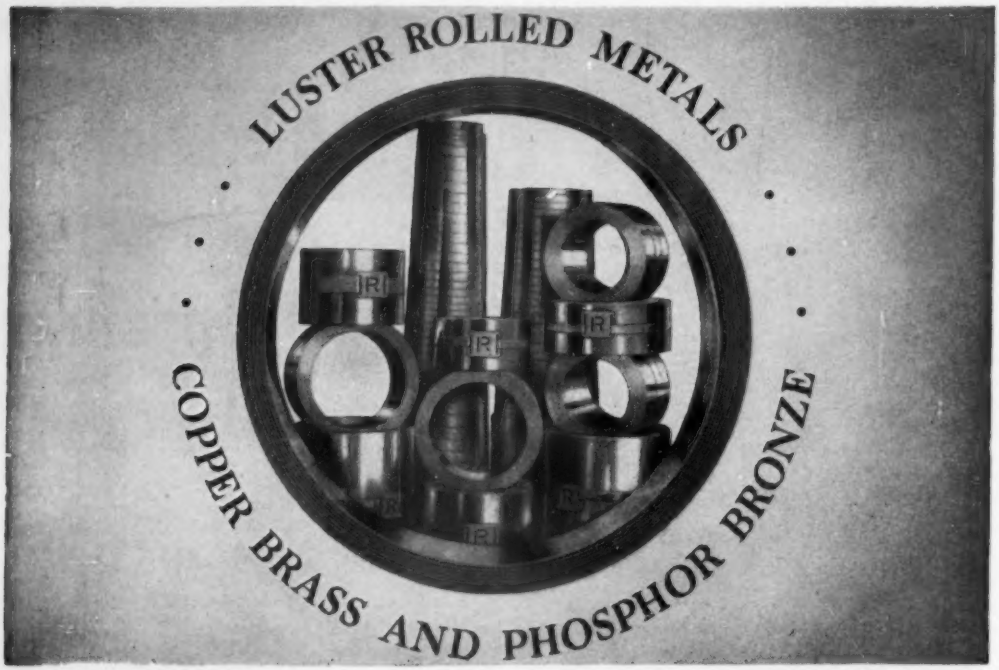

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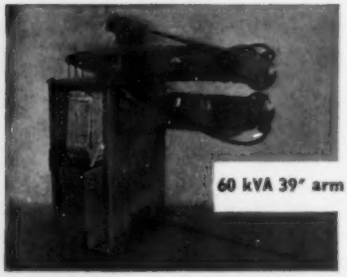

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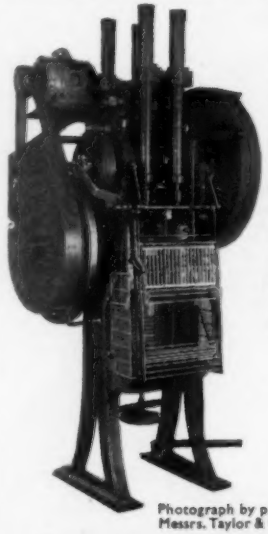

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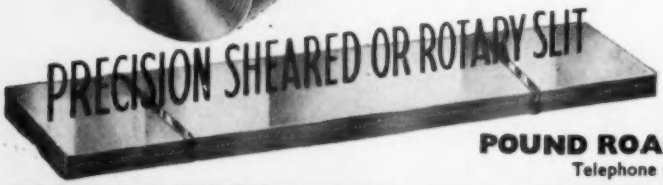

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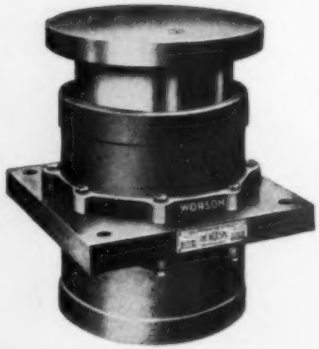

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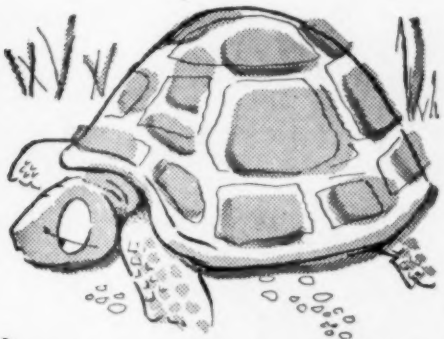

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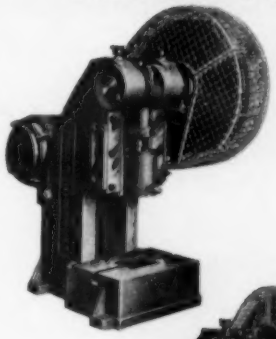
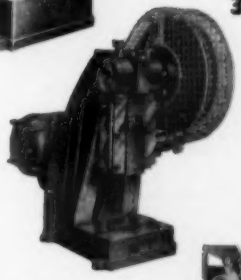


6 TON



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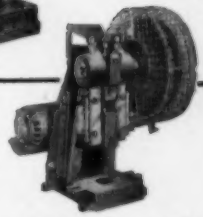

2 TON

Specifications

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Fixed stroke:	1¼", 1½" or 2"	1" or 1½"	⅞" or 1⅜"
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Open tool height:	8"	6"	4⅜"
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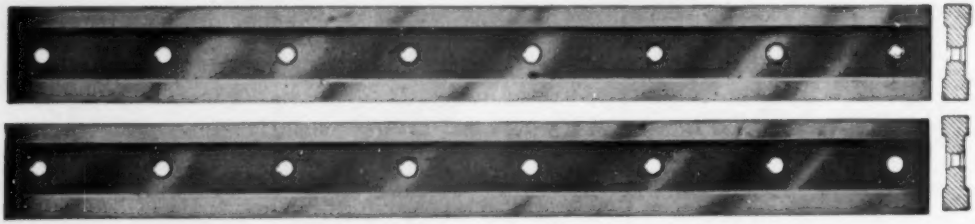

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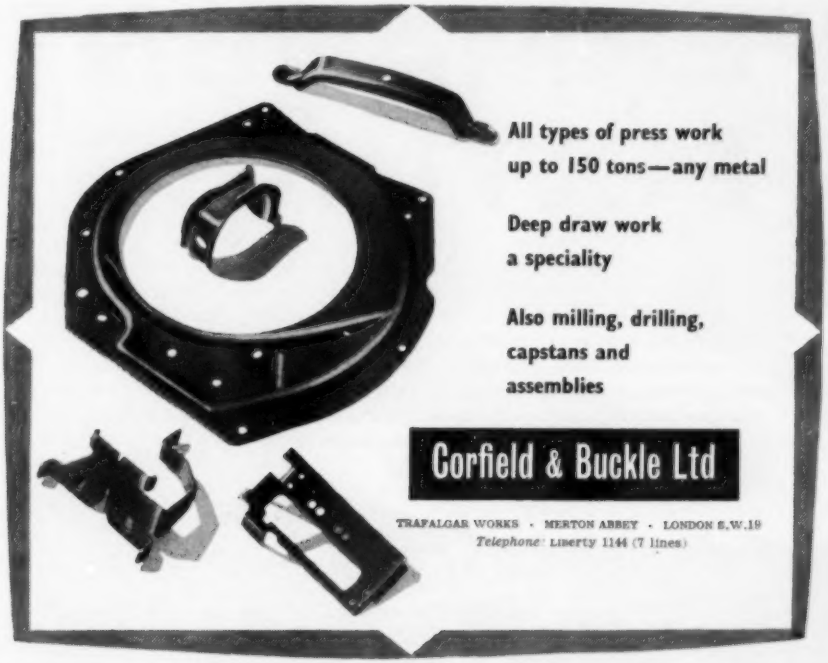
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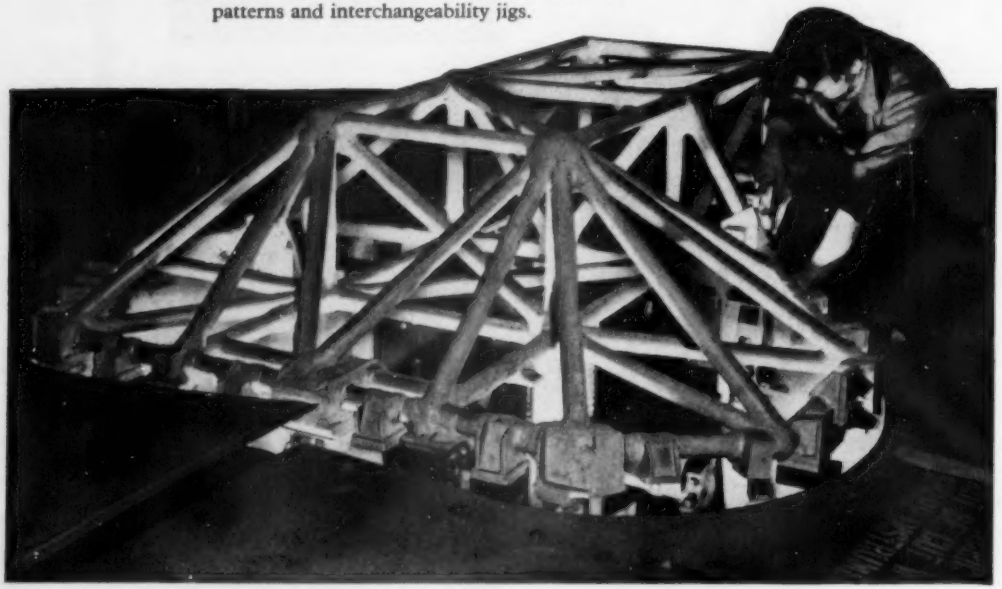

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Araldite epoxy resins are used

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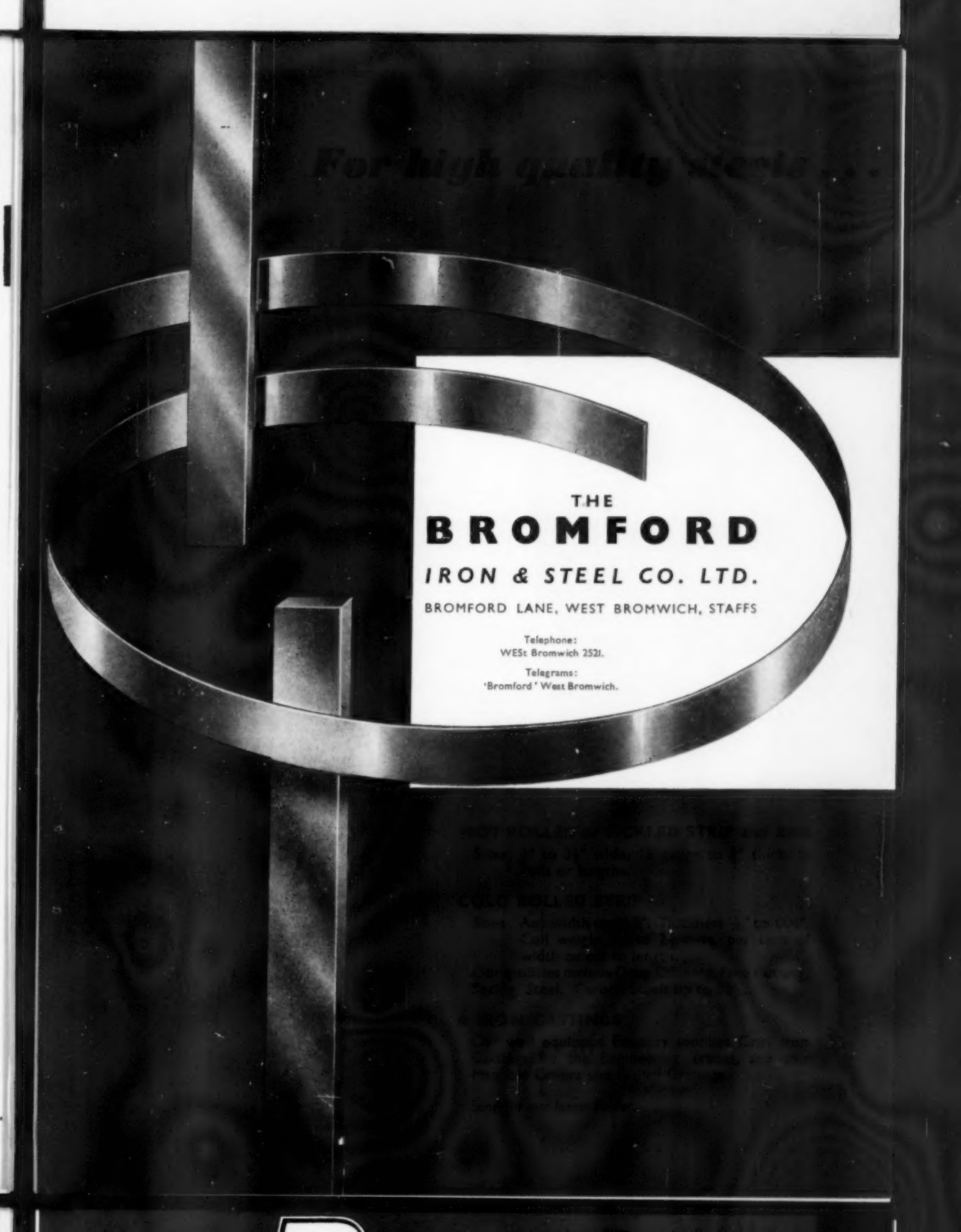
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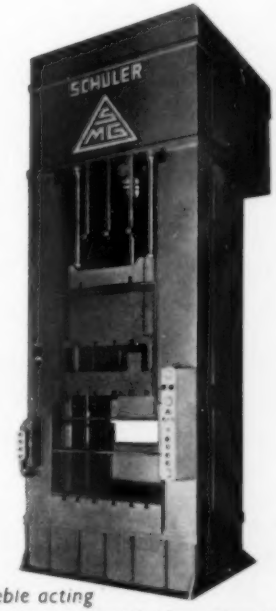

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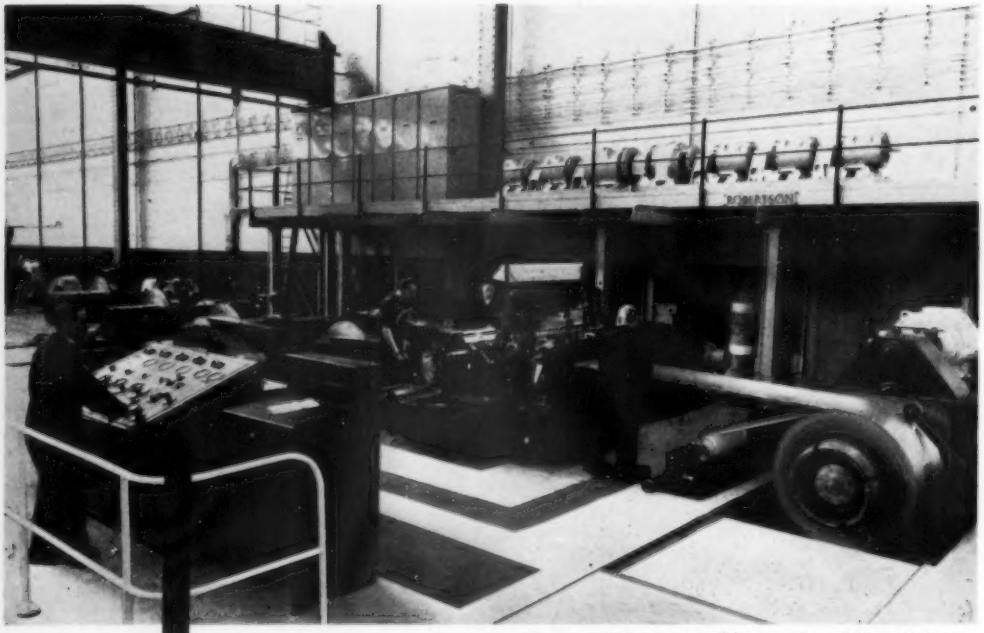

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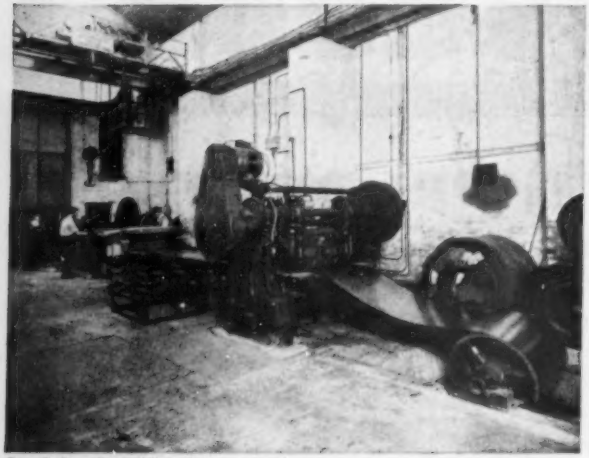

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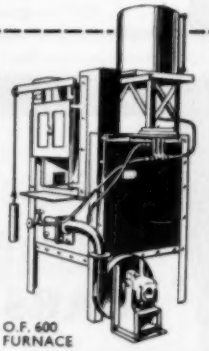

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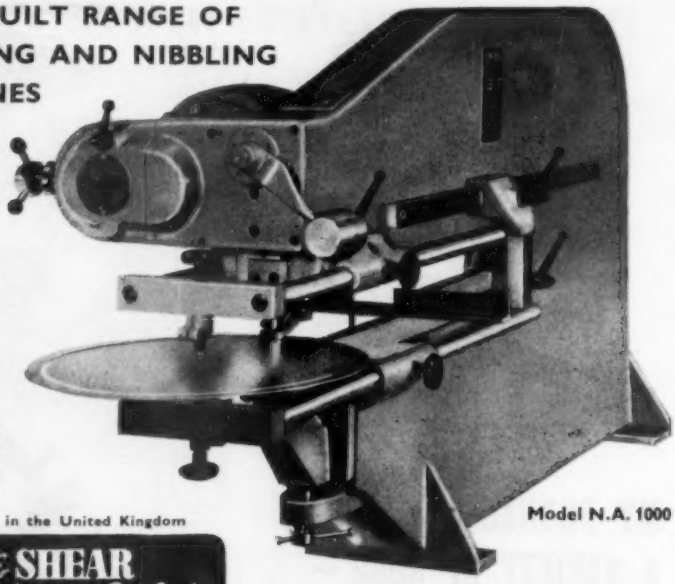

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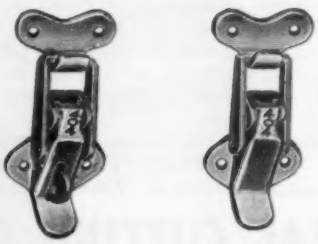

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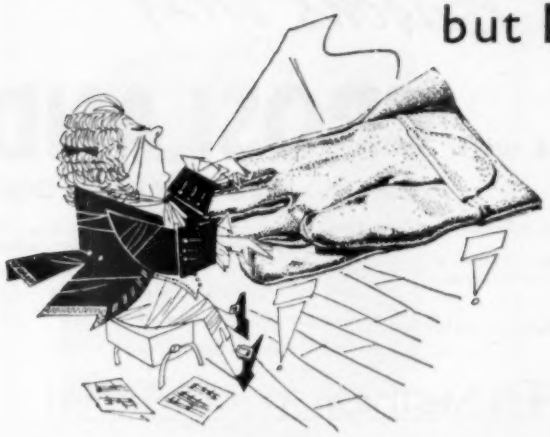

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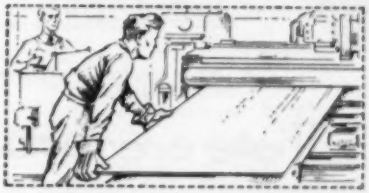

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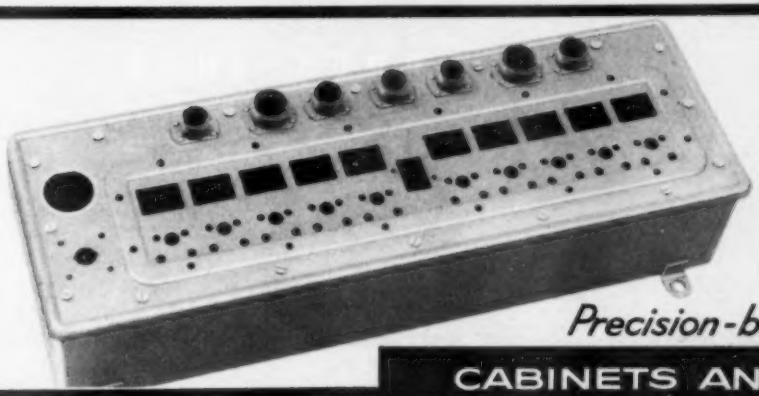

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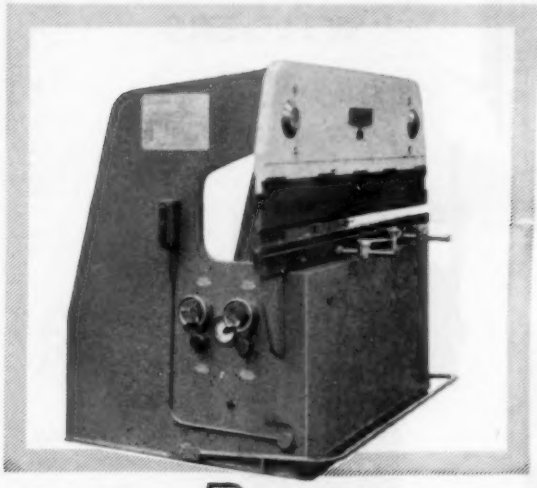

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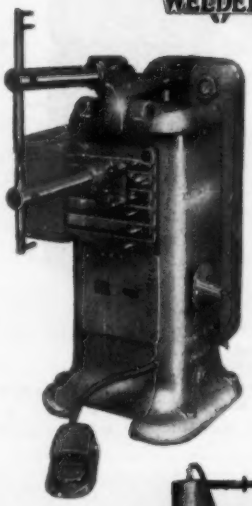

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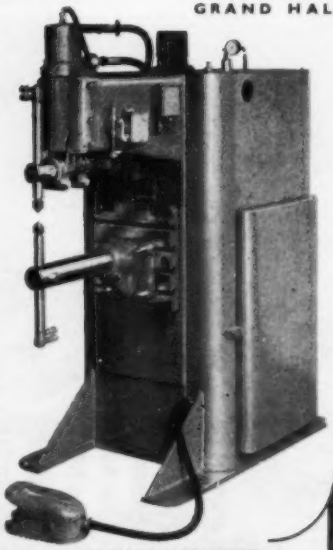

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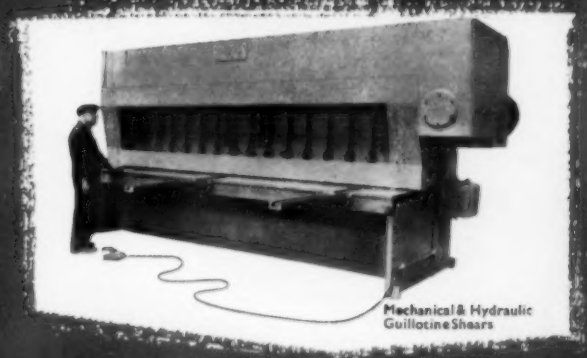

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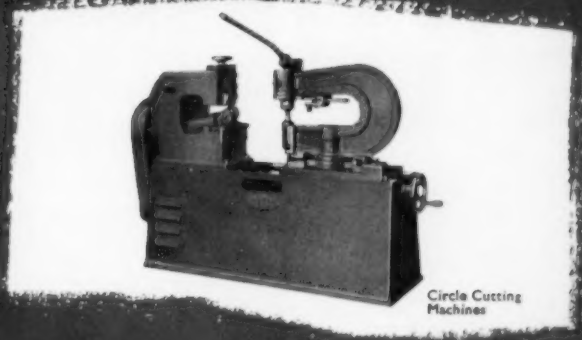

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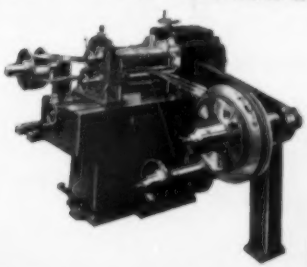

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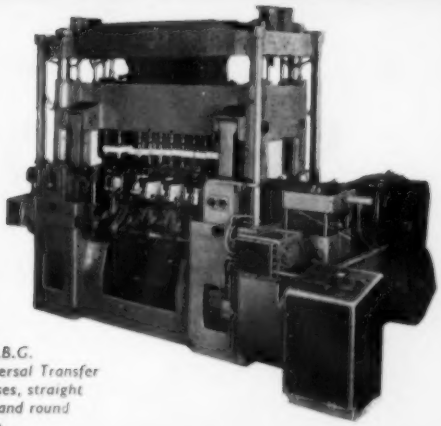

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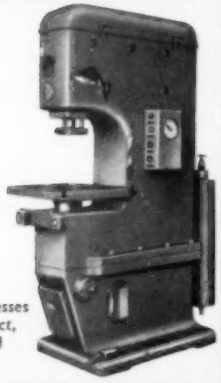

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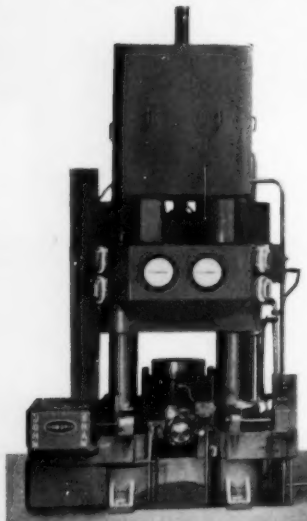

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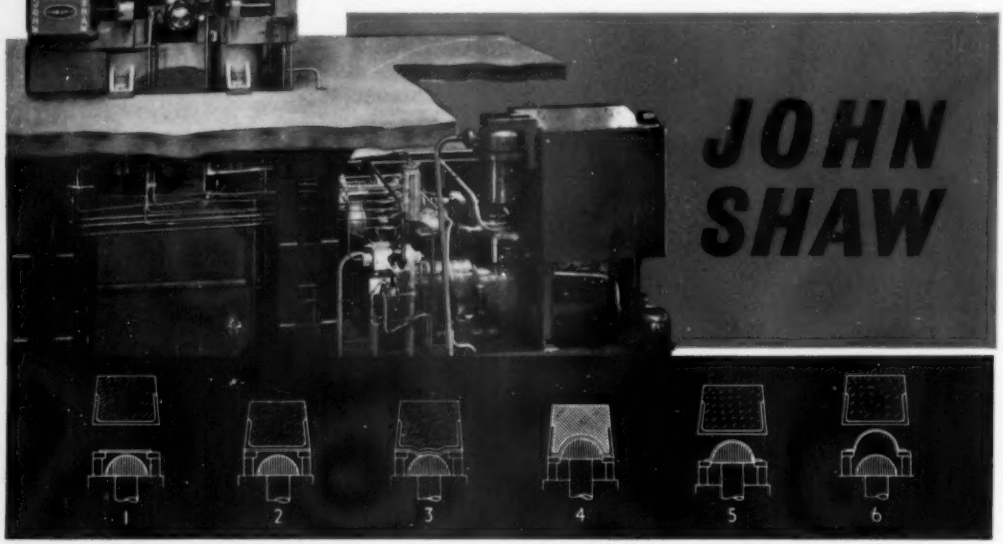

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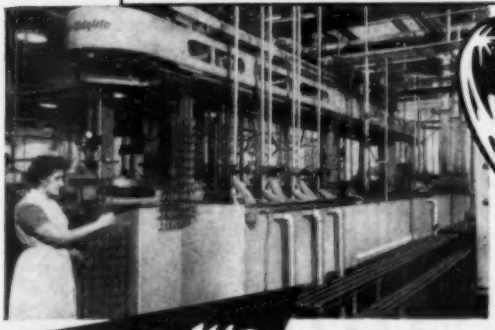

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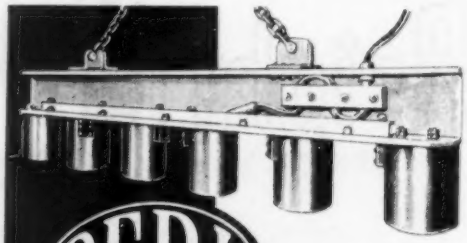

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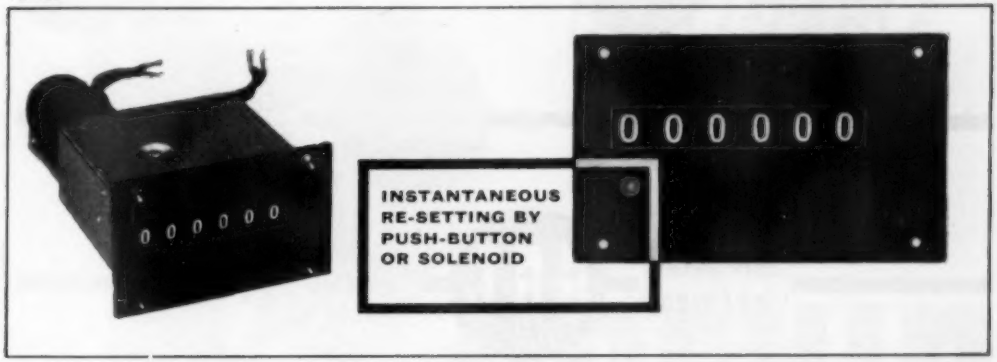

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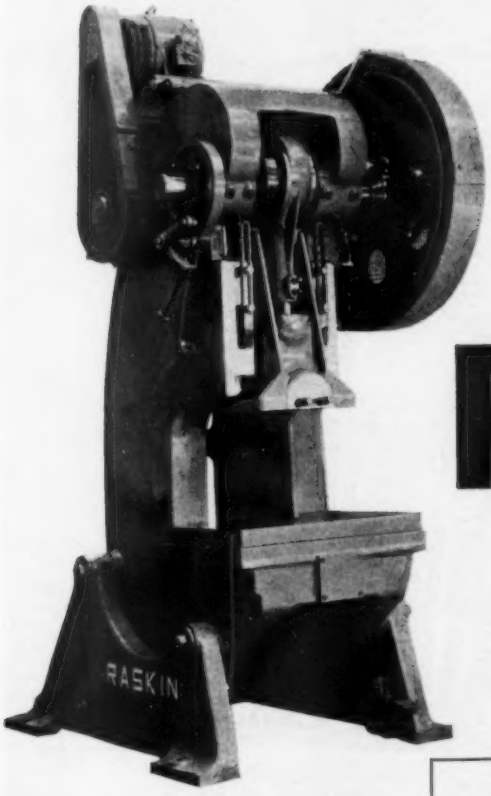

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45.IB ,,	45	$\frac{1}{4}$"-5"	28" ×18$\frac{1}{2}$"
45.IB Geared	45	$\frac{1}{4}$"-5"	28" ×18$\frac{1}{2}$"
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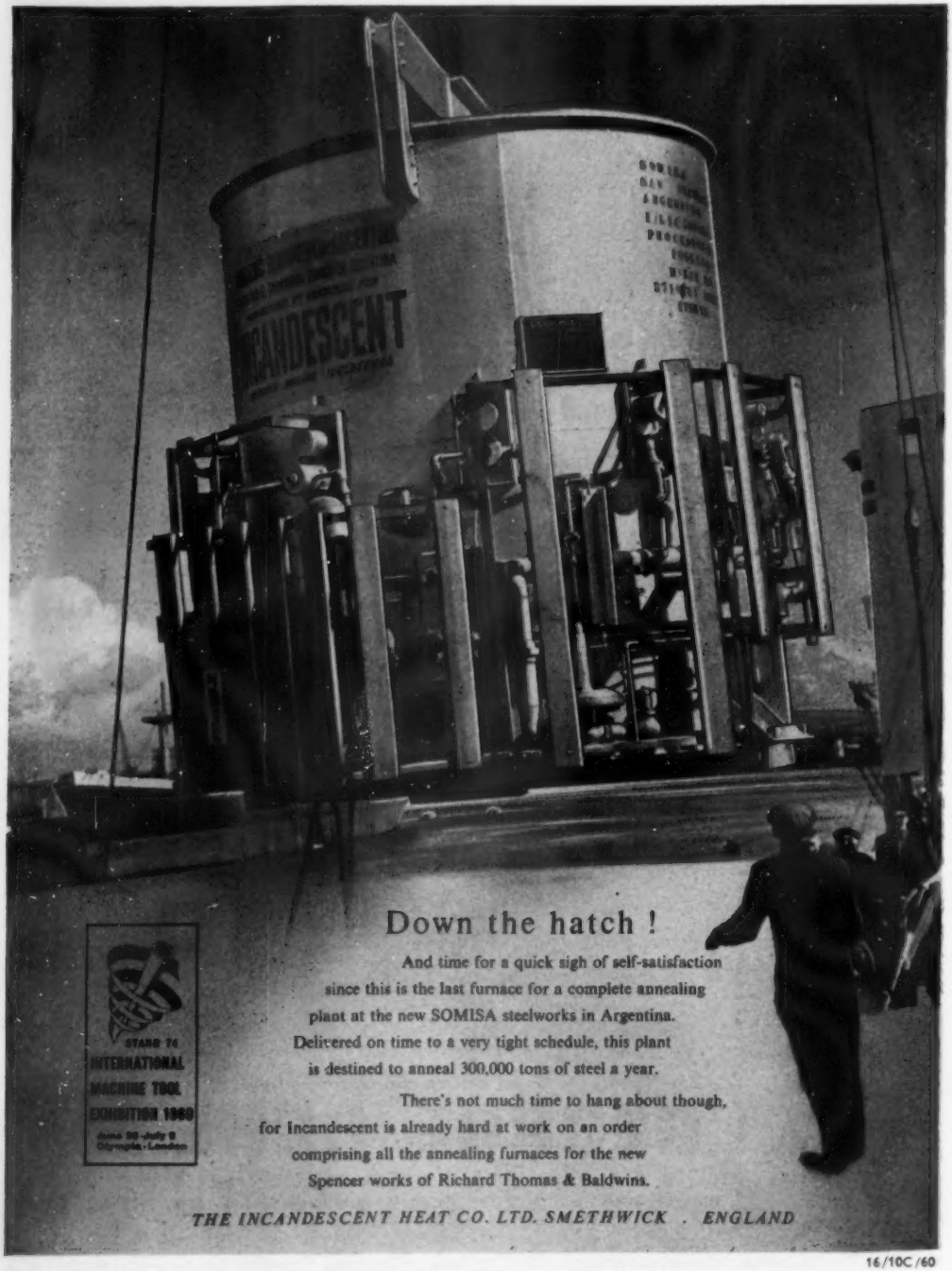
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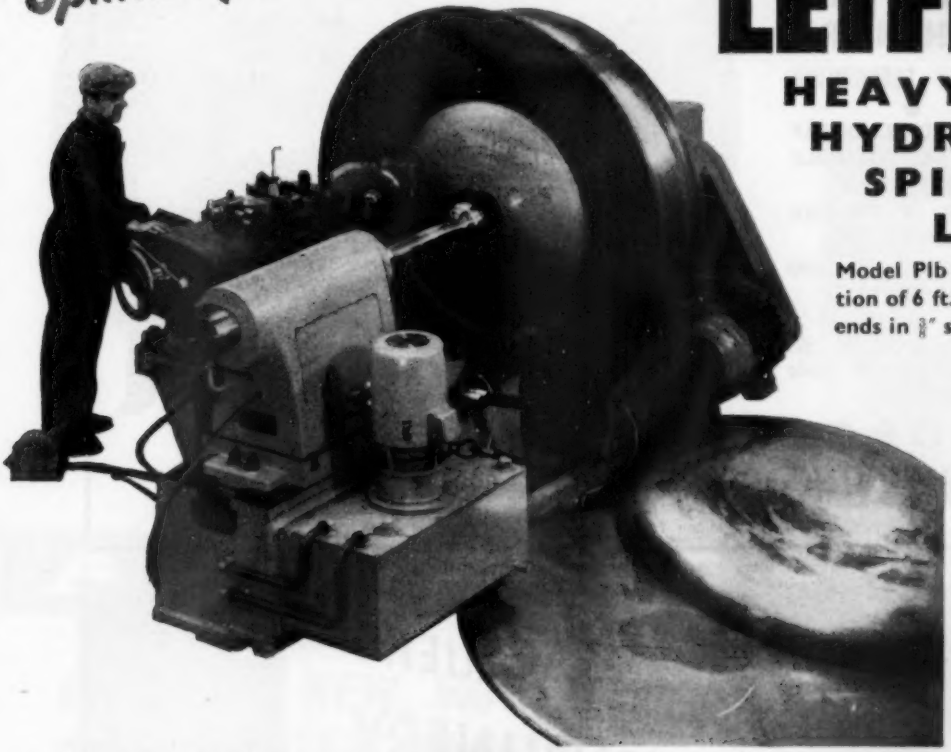

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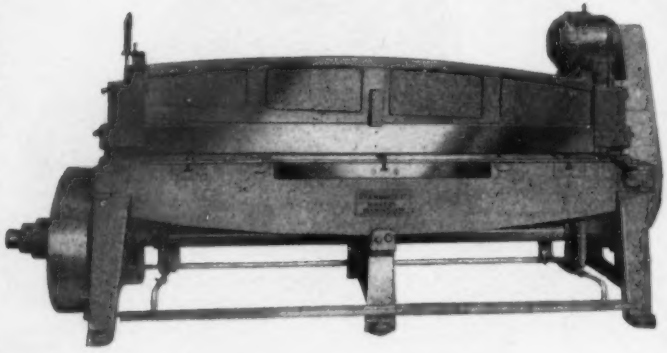

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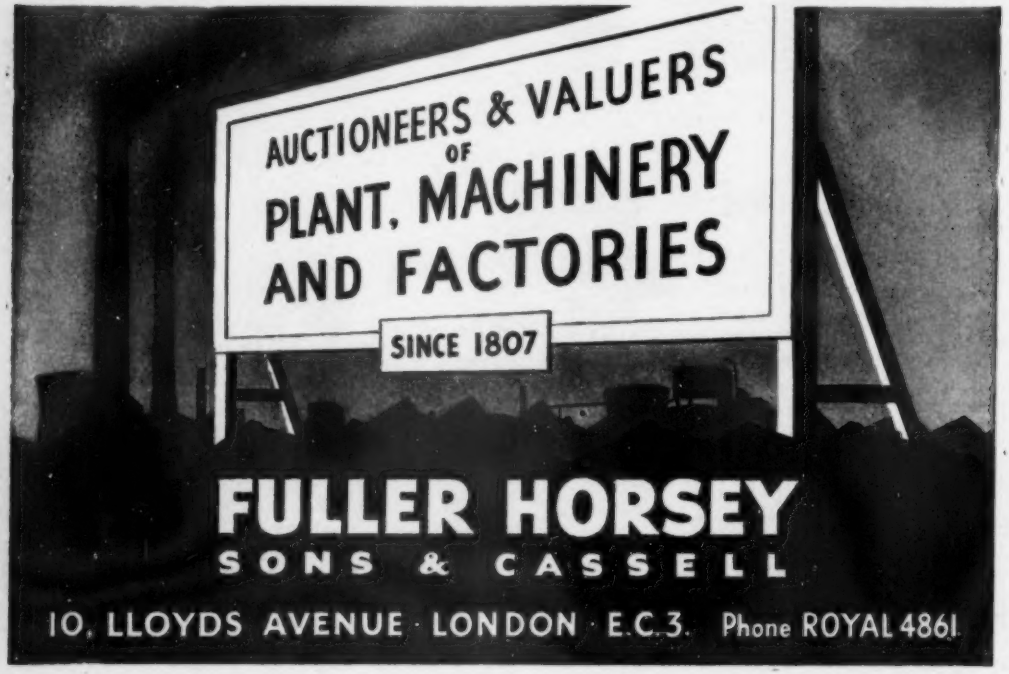

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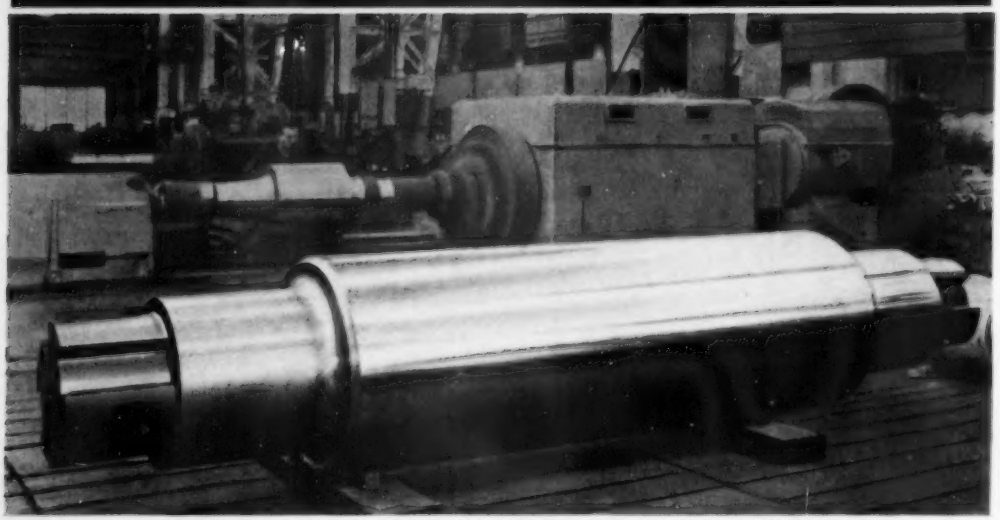

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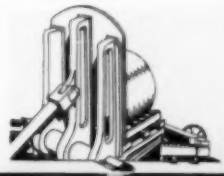

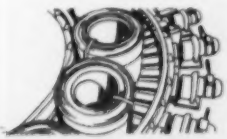

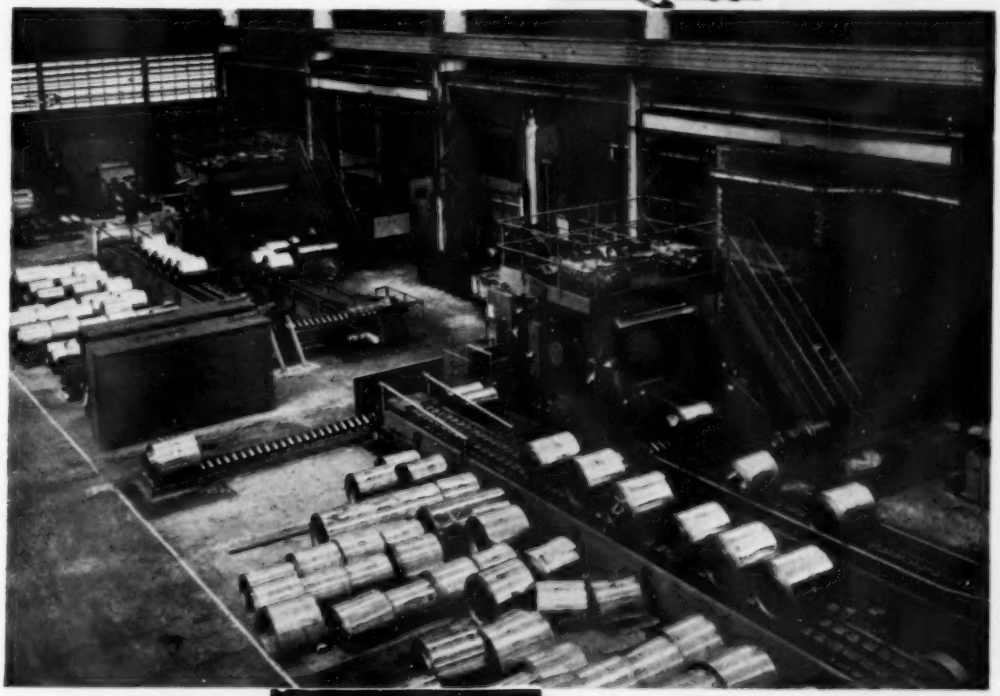

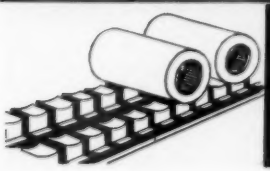

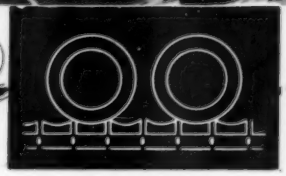

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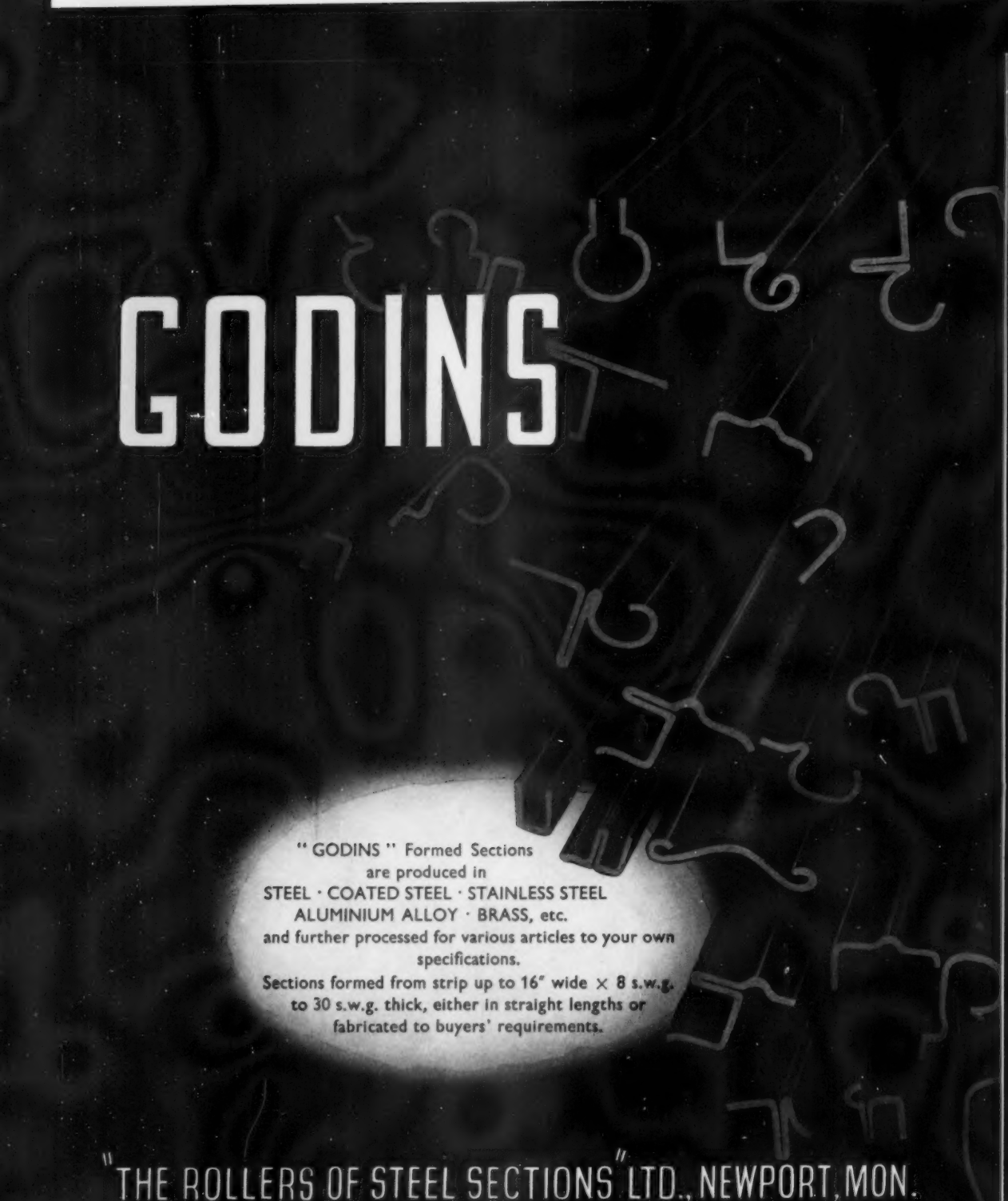

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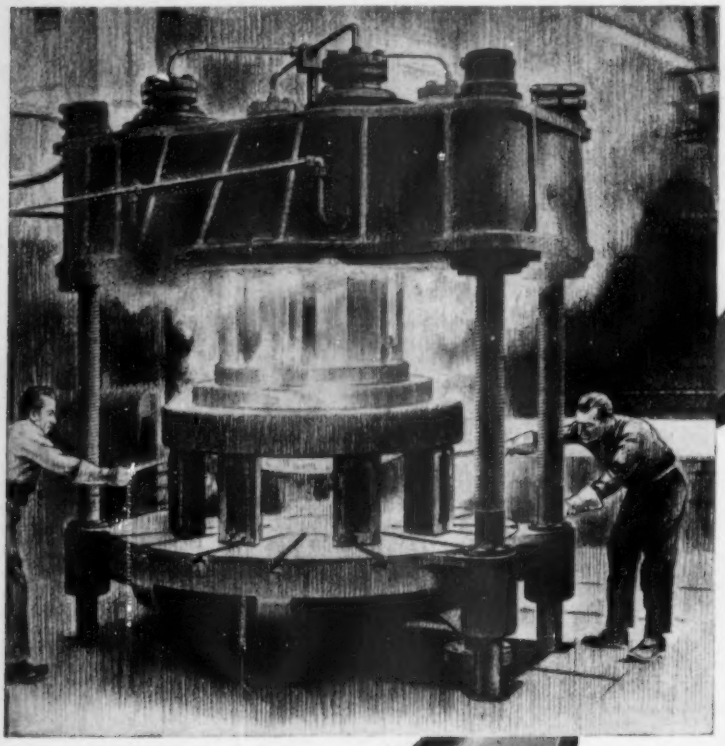

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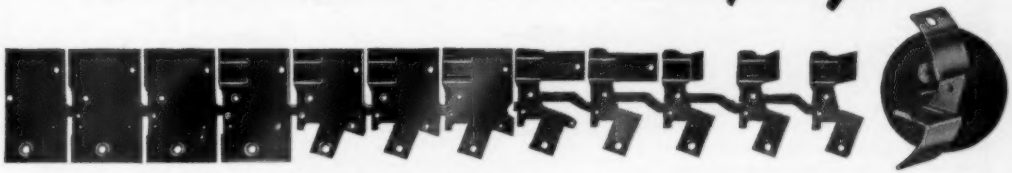

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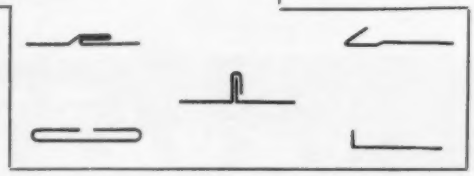

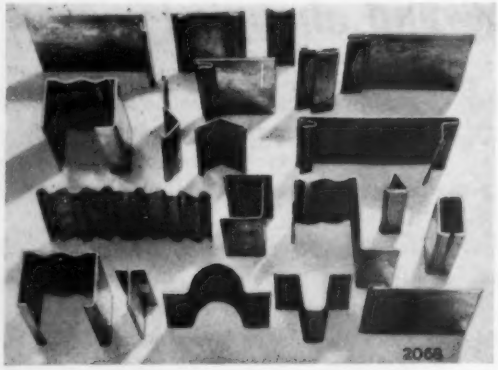

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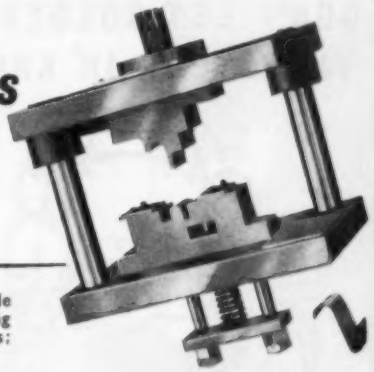
SANDERSON tool steels

NEWHALL



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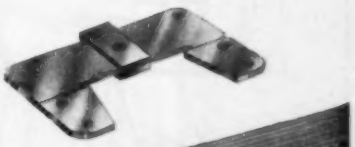
Forms available Black Bar annealed for maximum machinability; as bright turned bar, or as precision ground flat stock.



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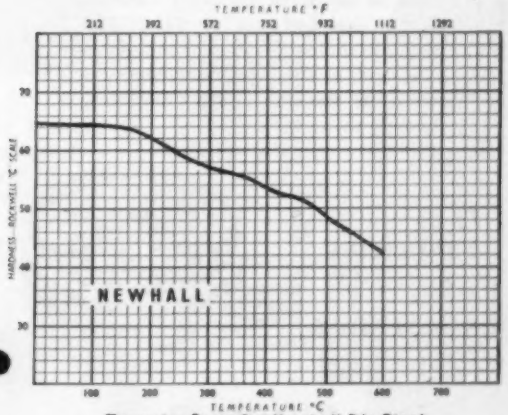

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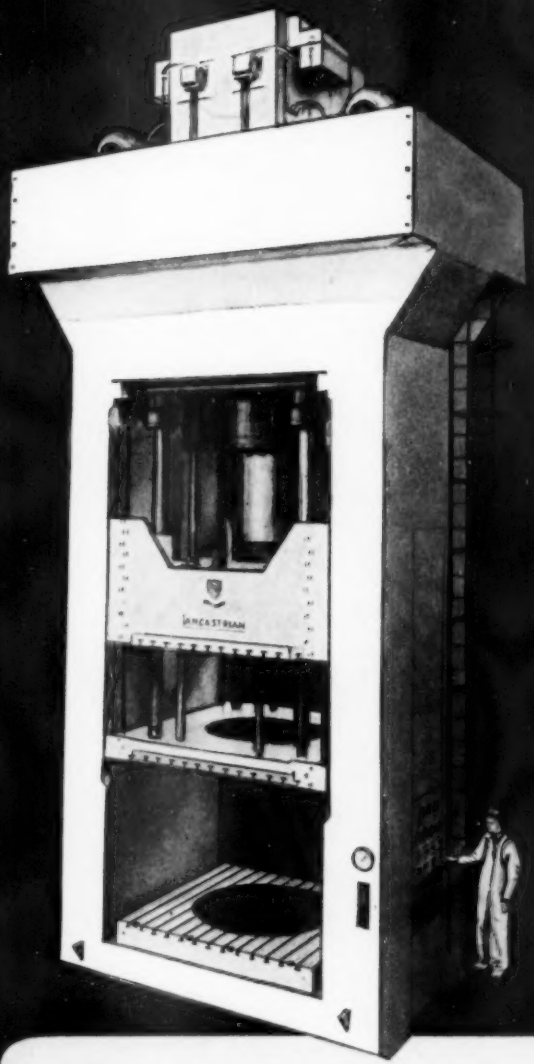

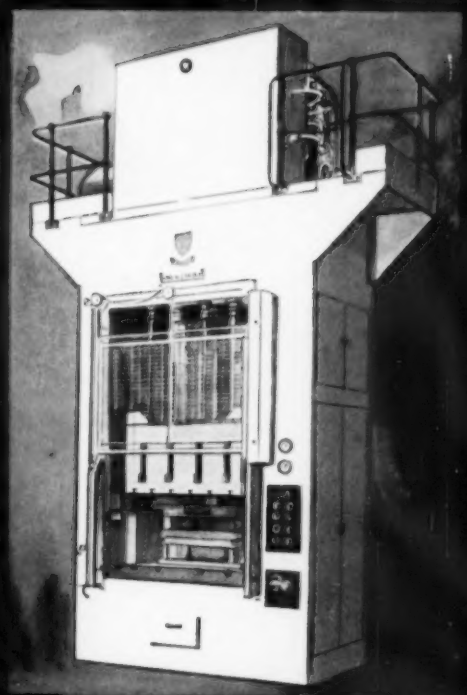

The illustrations show three typical Lancastrian Drawing Presses. At the top left is a 1,200-ton triple-action deep drawing press. This press exerts 1,000 tons pressure on the downstroke of the main slide, 200 tons on the downstroke of the blank holder, and 150 tons on the upstroke of the die cushion. The maximum daylight between bolster plate and blank holder is 8 ft. 6 in. ; maximum diameter of draw is 48 in. and maximum depth of draw is 36 in.; overall height is 40 ft. (32 ft. above ground) ; weight is 130 tons.

The illustration top right shows a Lancastrian 300-ton double-action drawing press, and the illustration bottom right shows a 150-ton triple-action drawing press, which are described in greater detail in other advertisements.

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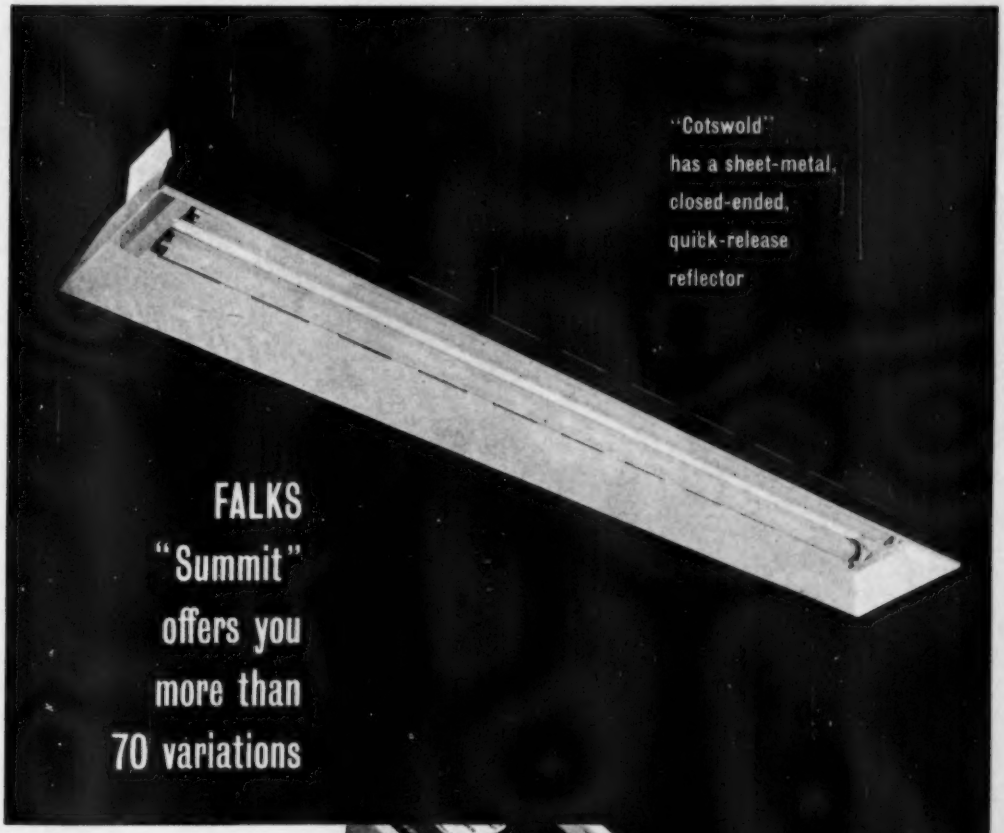

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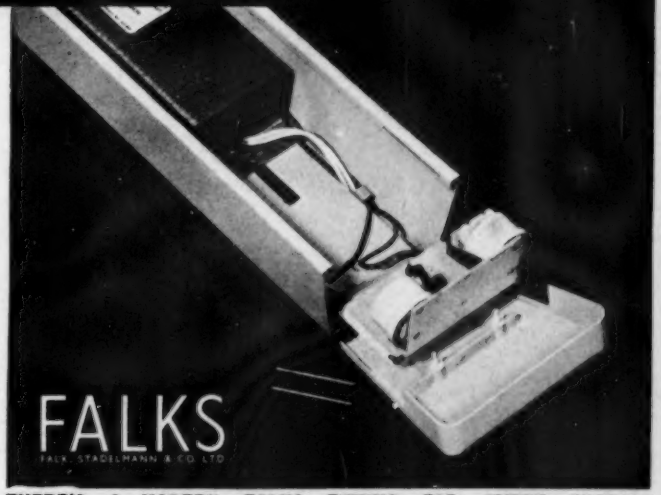

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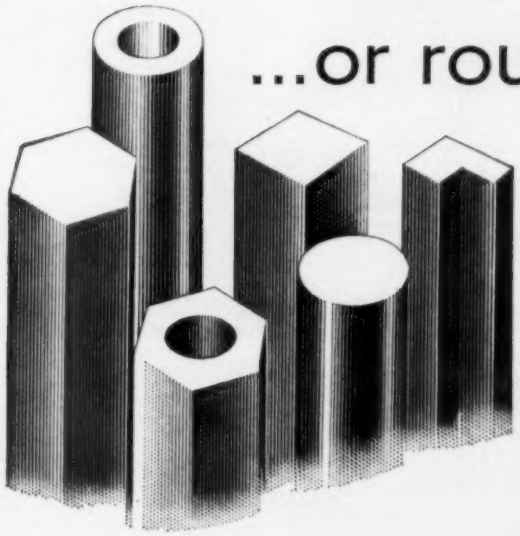

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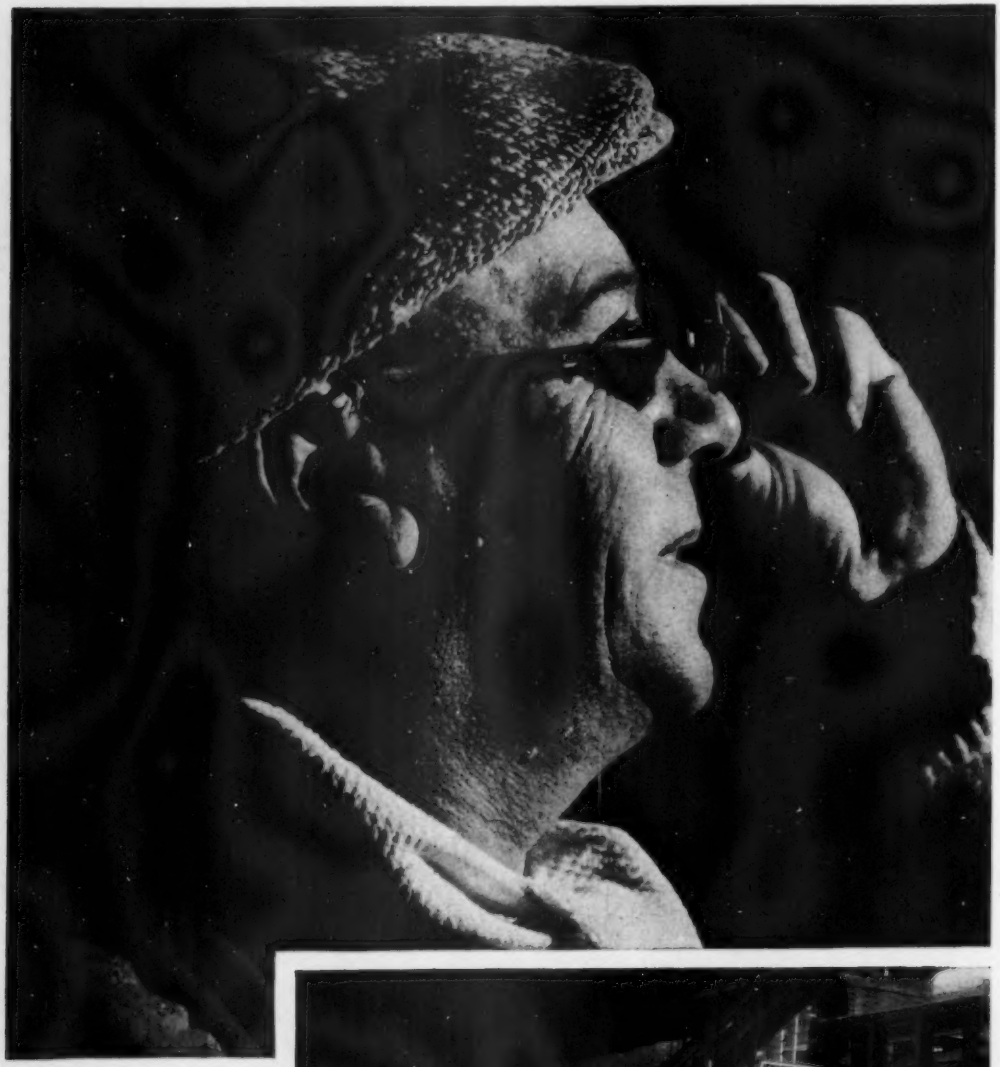

MR. LOMAN WELCH, first hand melter at the Appleby-Frodingham works of United Steel, Scunthorpe, will go to New York to show how he operates the 'Ajax' furnace. This new oxygen-breathing furnace has a record-breaking output 50% above normal, of finest quality steel.

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Britain led the world in creating plentiful low-cost steel. It was an Englishman, Bessemer, who by inventing his "converter" turned steel from a rarity into an everyday necessity.

Another Englishman, Brearley, discovered stainless steel.

But the accent will be on the modern developments that are putting Britain right in the forefront of steelmaking progress.

One of the highlights of the Exhibition will be 'Ajax', a new type of British steel furnace that is giving record outputs, 50% above normal. 'Ajax' furnaces breathe in oxygen and yield top quality steel in prodigious quantities. Up to 5,000 tons per week and more—from a single furnace!

New alloy steels have been developed for use in atomic reactors—including boron steel, which absorbs neutrons. As originally made, boron steel was too brittle to shape: but British steel scientists overcame this difficulty.

Visitors to the Exhibition will learn about some of the superb things made nowadays with British steel, from sports cars to radio telescopes and from precision tools to jet engines. The steel industry will show the vital contribution it is making to Britain's present-day prosperity.

A feature on the steel industry's display in New York forms part of the British Iron and Steel Federation's "Spring Report to the Nation".

The British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

ATOMIC REACTOR ASSEMBLY AT DOUNREAY, Scotland, described as "the most complicated stainless steel vessel ever made". This and other British steel triumphs will be featured at the British Exhibition, New York, this month.

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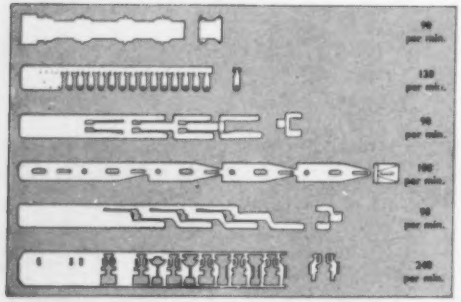

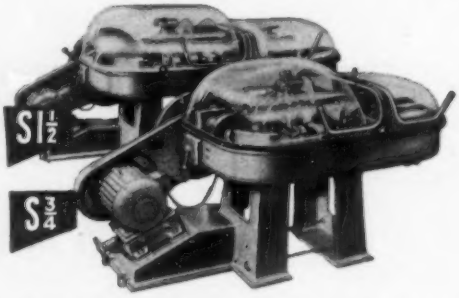

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Stroke back slide in.	2	1¼	½
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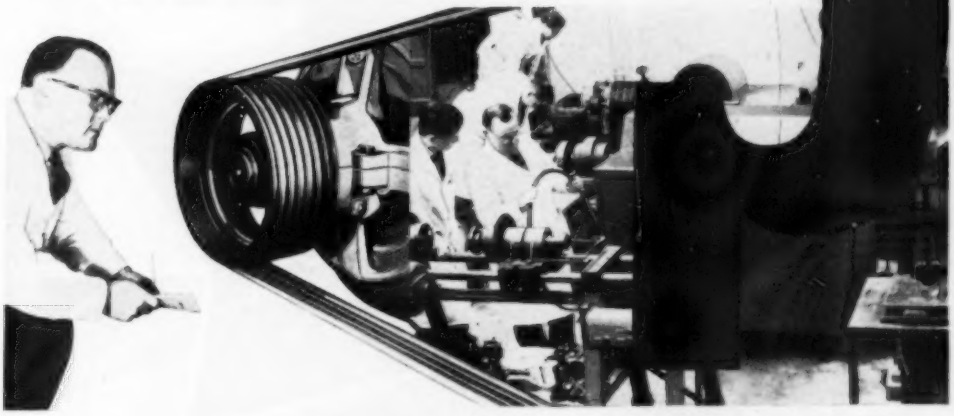

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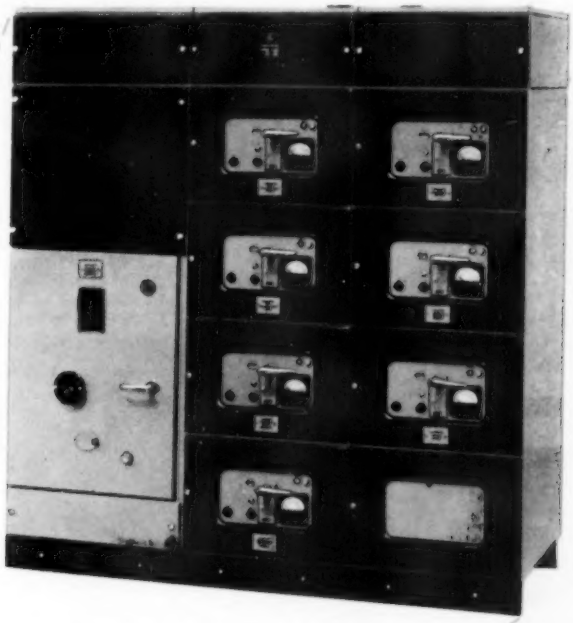

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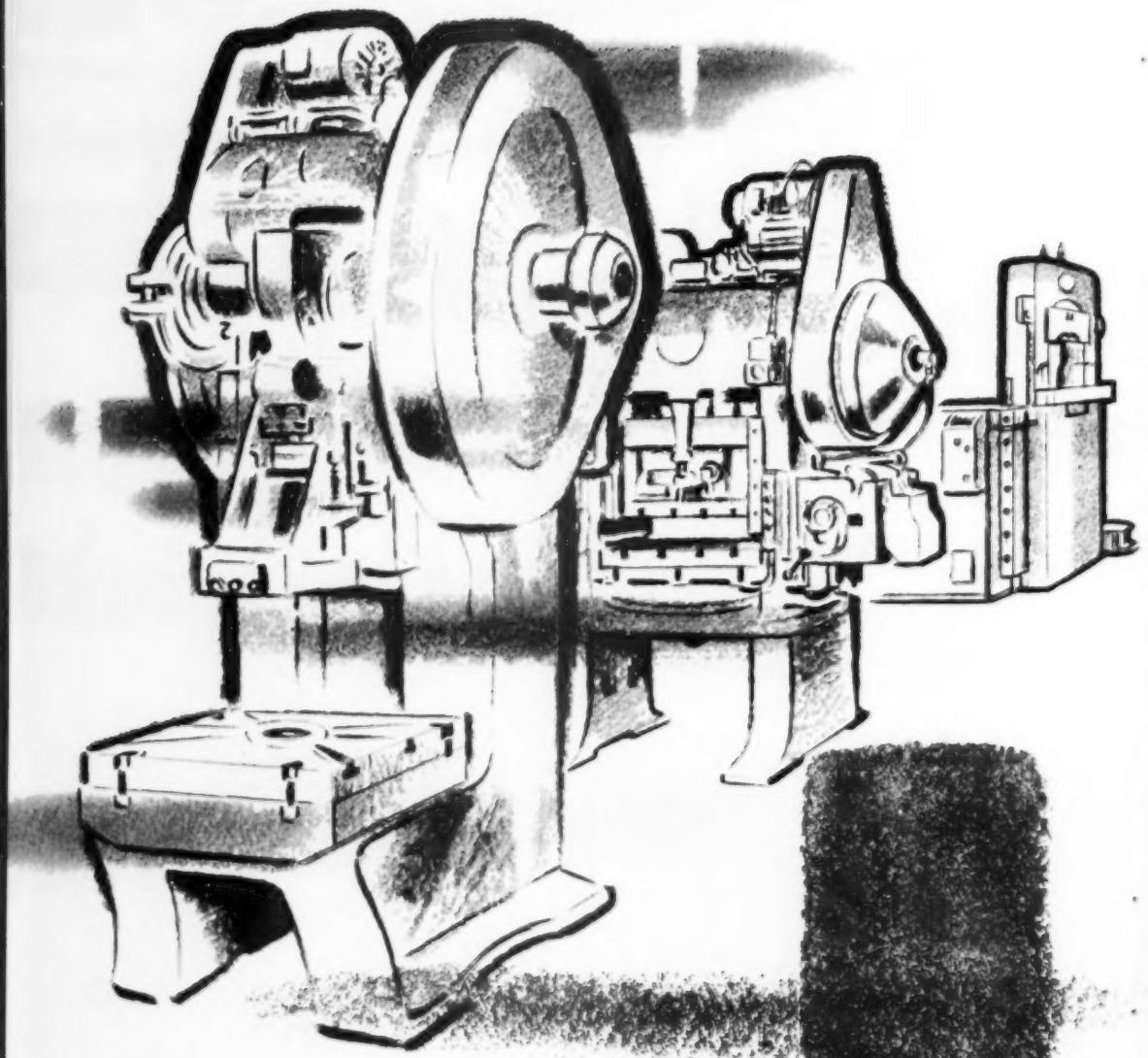

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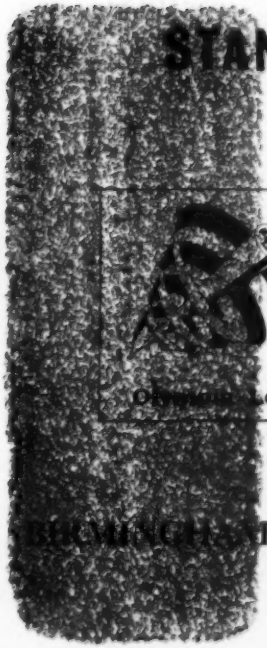

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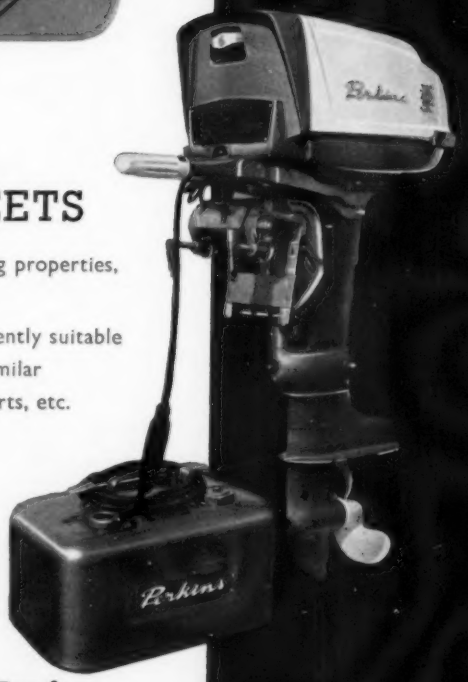

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* * *

INTERNATIONAL MACHINE TOOL EXHIBITION, OLYMPIA, JUNE 25-JULY 8 ..... **400**

The machine tool industry, both as a direct earner of foreign currency and as the provider of a wide range of equipment vital to the manufacturing industries of this country, is one of supreme importance to our industrial economy. There is no industry and no product which does not in the final resort depend upon the effective use of modern machine tools. In this preview of the International Exhibition of Machine Tools organized by the Machine Tool Trades Association, attention is mainly confined to equipment that falls within the purview of this Journal, and the descriptions given are based on information provided by exhibitors.

Letter to the Editor **446**

Some comments on the use of rubber pads for drawing cups.

High-Speed Rolling of Aluminium Alloy Strip **447**

A detailed description of the new plant installed at the Woodgate Works of Birmetals Ltd., which includes a Sendzimir mill and a new design of flash-butt welder.

A Four-Way Drain Unit **454**

"Tarentford"

Development and production of an interesting sheet-metal fabrication.

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Projection Welding of Low-Carbon Mild-Steel **457**

G. A. Phipps, A.M.Inst.W.

This revision of the section of the British Welding Research Association's Code of Practice (T.30) on the projection welding of mild-steel sheet extends the scope of the original recommendations. Certain amendments and additions have been made in the light of observations made by Commission III of the International Institute of Welding and further extensive experiments carried out by the British Welding Research Association. It is proposed to revise other sections of this Code of Practice at a later date.

British Non-Ferrous Metals Research Association **462**

Some Extracts from the Association's Annual Report for 1959.

Sheet Metal Data Sheet—6 ..... *facing page* **462**
Sheet-Metal Rolling Machines—2

This is the sixth in the series of data sheets specially compiled for "Sheet Metal Industries" by J. W. Langton, M.B.E., B.Sc.(London), M.I.Mech.E.

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A RECURRING PROBLEM

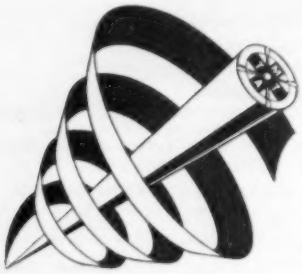
"ENOUGH is as good as a feast" is being applied by many to the ever-recurring problem of "exhibitions." During the past few weeks we have had the "Gas in Industry" Exhibition, the Production Exhibition, the Fuel Efficiency and Power for Industry Exhibition, the Mechanical Handling Exhibition, the Instruments, Electronics and Automation Exhibition and several others including private exhibitions organized by individual firms. All these exhibitions have varied widely both in size and scope, all have shown many interesting new developments, and the physical size of each has been in no way a proportional indication of their value to industry as a whole.

At the end of this month one of the largest exhibitions of all opens, the International Machine Tool Exhibition, with several hundred stands and exhibitors from many different countries. It would be invidious here to attempt to stress the importance of the machine-tool industry to the country as a whole, as most members of the community, technical and otherwise, are conscious of the fact that the machine tool constitutes a major factor in improving our standard of living and our future progress. What concerns this Journal and the industry it represents is the additional recurring problem of "what is a machine tool."

On the Continent it is generally agreed that such machines as presses, guillotines, spot-welding machines, etc. are machine tools and as such it is an accepted fact that they are included in the correct proportion in all machine-tool exhibitions. In this country, however, there is still some doubt as to the correctness or otherwise of including machines of this nature in exhibitions that, in the main, feature lathes, milling machines, etc.

Elsewhere in this issue we give a preview of the equipment of interest to our own field that will be shown at Olympia later this month, and about 60 stands out of the total are either featuring or showing as part of the exhibits sheet-metal working equipment. The number of stands is not a true measure, however, of the size of the industry itself.

Although it cannot be denied that, to the technical press at least, the growing number of exhibitions constitutes a great difficulty in reporting them adequately to readers, we also cannot pass over this problem of where sheet-metal-working equipment should be shown. And we are left wondering whether it is not time that this branch of industry had an exhibition of its own.



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A Preview of Working

The Addison Tool Co. Ltd.

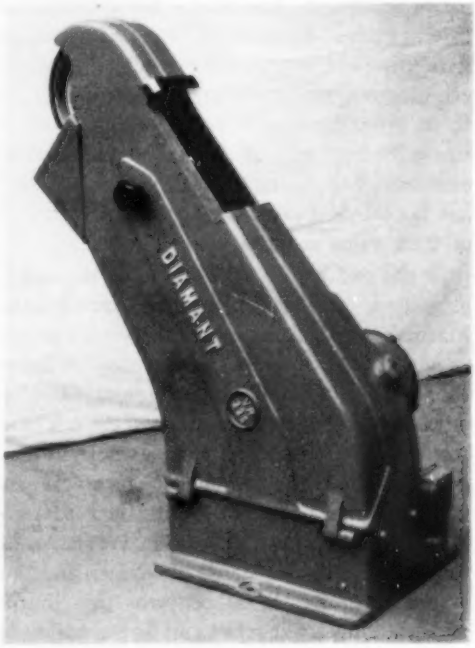
Stand 613A, Empire Hall, Second Floor

A new model of the Diamant abrasive belt grinding machine (Fig. 1) has been brought on to the market and will be seen at the company's stand at the exhibition. The machine has been specially designed for belt grinding as opposed to one that can merely be used for this operation. It is small, compact and powered with a motor which is economical to run, and is the equal of many larger machines. A special drawer to receive the grinding dust is a feature of this otherwise totally enclosed machine and thus eliminates a common cause of danger and annoyance. Another important feature is that, on the opening side cover, the tension of the belt is automatically slackened for quick changing. It is robustly built, and fitted with the latest type belt driving wheel. All parts are readily accessible for easy maintenance, and the pleasing lines of the machine will harmonize with any modern workshop layout.

The Berlett KS.60 small automatic circular saw can also be seen on this stand. The bar on the machine feed is operated hydraulically, as are the vices for gripping the work, and the traverse motion for the saw carrier. By means of a scale, and a micrometer dead stop, graduated in 0.004-in. divisions, the stroke of the bar feed hydraulic cylinder can be set to advance the stock through distances ranging from 0 to 15¾ in. Provision is made for either continuous step feeding, or single piece cutting, and when single lengths in excess of 15¾ in. are required, the saw traverse can be set to operate only after the bar feed has functioned twice, thereby allowing pieces up to 31½ in. long to be cut off.

Once the bar has been loaded, and the stroke of the bar feed mechanism has been set, the operation of the machine is fully automatic. There are two pairs of hydraulically-operated vice jaws, one incorporated in the bar feed for gripping the stock during feeding, and the other for holding the work while cutting is in progress. These pairs of jaws are electrically interlocked, and the arrangements are such that when one pair of jaws is closed the other pair is open.

Fig. 1.—Diamant abrasive belt grinder.



MACHINE TOOL 1960

Olympia—London June 25-July 8

some of the Sheet-Metal-Exhibits

The machine-tool industry, both as a direct earner of foreign currency and as the provider of a wide range of equipment vital to the manufacturing industries of this country, is one of supreme importance to our industrial economy. There is no industry and no product which does not in the final resort depend upon the effective use of modern machine tools. In the preview of the International Exhibition of Machine Tools organized by the Machine Tool Trades Association, which we publish below, attention is mainly confined to equipment that falls within the purview of this Journal, and the descriptions given are based on information provided by exhibitors.

Edgar Allen and Co. Ltd.

Stand 505, *Empire Hall, First Floor*

Edgar Allen will highlight the following exhibits from their comprehensive display of engineers' cutting tools, form tools and deposit-welded tools ; die-steels ; alloy-tipped hot saws ; magnetic chucks and examples of progress in powder metallurgy.

Allenite tungsten carbide Plowrake tools will plane high-tensile steel castings, die-blocks, etc., at speeds of 80 to 100 ft. per min. with $\frac{3}{4}$ in. (approx.) depth of cut and a feed of $\frac{1}{32}$ in. per stroke. The well-known range of Stag Major high-speed steel butt-welded tools, hardened and ready for immediate use, provide freedom from the worries of forging and hardening high-speed steel tools.

Athyweld humped-back deposit-welded parting tools are designed to avoid recurring tool breakage, especially where semi-skilled labour is employed.

Hard-facing materials of various characteristics and analyses, up to 85 per cent tungsten carbide alloys will be shown applied to earth and rock-processing equipment. A method of depositing hard-wearing faces will be exhibited for the first time. The material, deposited on sample components by metal spray process, is not mechanically bonded, but fuse-welded to the parent metal, and its function is to provide a relatively thin but high abrasion-resistant surface. Tests have shown that this process will find many applications in the engineering industry.

The company will also exhibit a wide range of single point cutting tools in cemented tungsten carbide as well as carbide tips and parts in many shapes and sizes.

Other exhibits will illustrate the Athyweld process applied to the repair of die-castings, and intricate die-casting dies made from Edgar Allen special tool steels will be included in this section.

Finally, an 18-in. by 36-in. fine pole magnetic chuck with push-button automatic chuck controller will be introduced. It is the product of J. H. Humphreys and Sons Ltd., of Oldham, a subsidiary company of Edgar Allen and Co. Ltd. Visitors to the stand are invited to work the equipment themselves and observe the operating cycle of the demagnetizer controller.

A.R.O. Machinery Co. Ltd.

Stand 121, *National Hall, Ground Floor*

This company will exhibit a comprehensive range of portable spot-welding equipment, from very light, hand-operated welding guns used for car-body repair and general maintenance work to large production units for the domestic, durable, motor and aircraft industries.

All these welders are complete with automatic process-control equipment, ranging from a simple weld timer to a complete process controller giving fully automatic 5-stage sequencing. The company have specialized in portable spot-welding guns for a

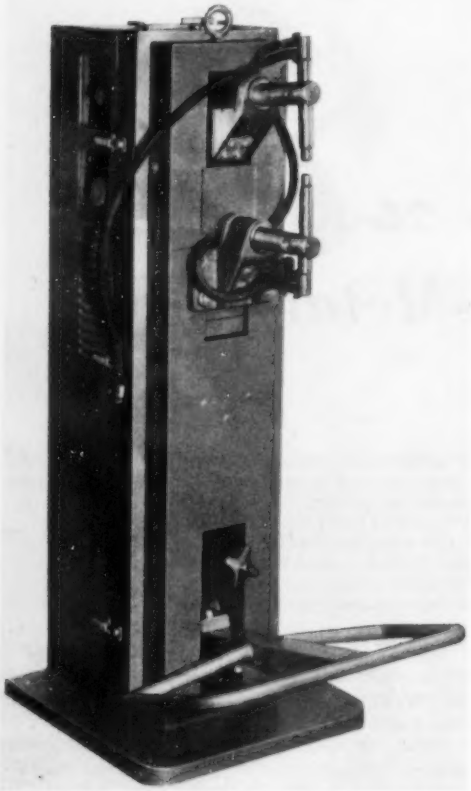


Fig. 2.—A.R.O. foot-operated pedestal welder, Model M304

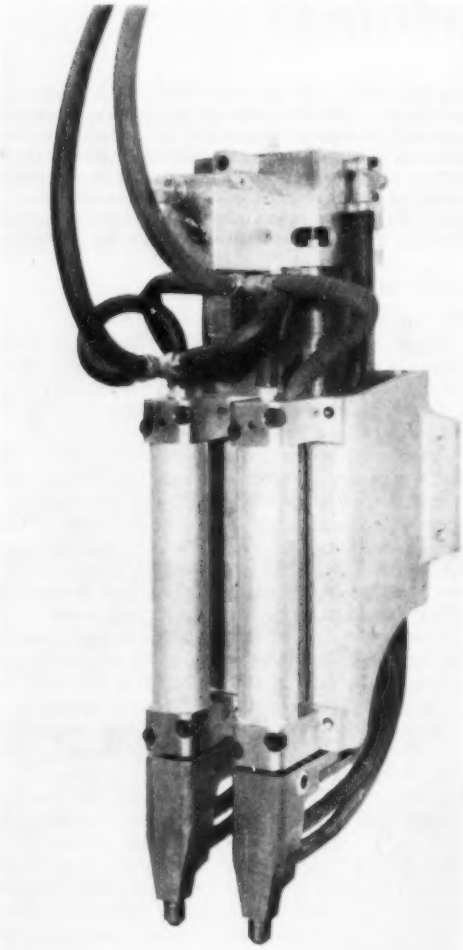
number of years and all pneumatic and oildraulic components are designed, developed, made and tested in their own factories. Of particular interest will be electrovalves, pilot valves, poppet valves and manifold valves. Double-acting 3, 4 and 5-stage air cylinders in a standard range as well as the new safety electric foot switch will be on display.

In addition to Types M30 and M30V bench welders, two new pedestal welders, the foot-operated M304 and the air-operated spot/stitch welder type M314 will be shown for the first time. Robust in design, they are accurately controlled by process timing and are simple to set up. Both welders are capable of welding mild-steel plate up to 8 s.w.g.+8 s.w.g. and non-ferrous metals up to 18+18 s.w.g.

Also being exhibited for the first time is the type DP60 air-operated weld/press unit. This comprises a tapped welding transformer complete with 4-stage air cylinder, electrically operated valves and secondary jumpers, providing a most adaptable weld/press unit. Operating on the series-welding principle, the pitch adjustment on each unit is from 1 in. up to 4⅜ in. One or several of these units can be controlled by one control panel and the weld/press units can be energized simultaneously or in cascade with a "customer choice" of condenser charging timing and ignitron contactor, or alternatively electronically controlled.

The spring balancer range has been introduced to enable welding guns to be manipulated with greater freedom. These balancers are designed for various weight ranges and can be set by a worm gear to produce balance over a movement length of 4 ft. Finger-tip pressure can move a welding gun weighing 180 lb. A built-in safety brake, a nylon

Fig. 3.—Air-operated weld/press unit, DP60 (A.R.O.)



overmoulded suspension cable together with a stop/start control, ensure that this balancer is safe and efficient.

Brayshaw Furnaces Ltd.

Stand 1A, Grand Hall, Ground Floor

Exhibits will comprise the following :—

A gas-heated shaker hearth furnace (Fig. 4) for the continuous heating of miscellaneous small parts. Operating temperature range 850° C. to 1,000° C. Heating area of tray 8½ in. wide by 25 in. long. Nominal output 56 lb. per hour. Gas consumption maximum 300 cu. ft. per hour.

Gas- and air-blast heated liquid bath furnace for use with fusible salts, cyanide or lead. Normal maximum operating temperature 900° C. Pot 9 in. dia. by 13 in. deep. The furnace is equipped with conical hood, davit-type swing jib crane and Brayshaw gas and air proportioning valve having single lever control. Gas consumption maximum 320 cu. ft. per hour.

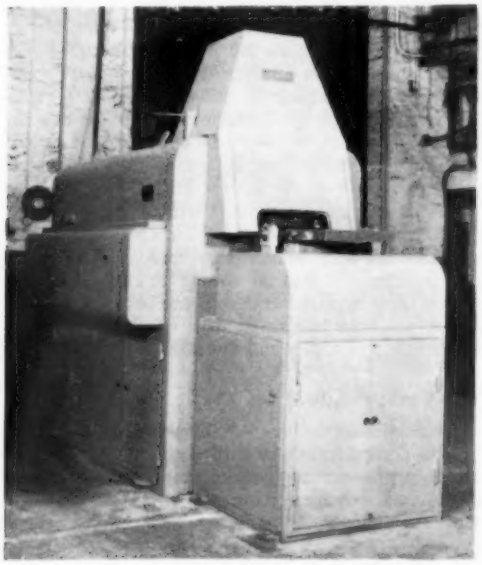
Electrically-heated oven furnace for general heat treatment. Operating temperature range 500° C. to 1,050° C. Size of working chamber 12 in. wide by 9 in. high by 18 in. long. Maximum rating, 9 kW.

Natural-draught gas-heated vertical type air recirculation furnace for tempering and similar temperature processes. Operating range 100° C. to 750° C. Work basket size 12 in. dia. by 20 in. deep.

Gas-heated floor-mounting twin-chambered high-speed steel-hardening furnace. Preheating chamber heated by the waste products of combustion from the main heating chamber. Both chambers measure 7 in. wide by 3½ in. high by 9 in. deep. Maximum operating temperature 1,400° C.

Venturi-type self-proportioning town's gas burner, capacity 120 cu. ft. per hour. Turn down ratio 7 : 1.

Fig. 4.—Gas-heated shaker-hearth furnace



The Bronx Engineering Co. Ltd.

Stand 107, National Hall, Ground Floor

The machines to be exhibited on this stand are : a 90-ton press brake (Series 910) (Fig. 5); an 8-ton hand-operated press brake; a new design of 3-roll pyramid pinch-type plate bending rolls (Series PBLA410) and a multi-cross-roll tube straightening machine (Series 6.CR.2) having a capacity of $\frac{3}{16}$ to $\frac{5}{8}$ in. dia. (Fig. 6).

The 90-ton brake has a bending capacity of 10 ft. by 10 g. between the columns and 12 ft. by 10 g. overall the beams. It can operate at 30 strokes per min., the stroke length being 3 in.

The frame is of unbreakable welded steel construction, stress relieved. The bottom beam rests on machined abutments on the two side columns and is welded in position to form with the heavy top crown a rigid box-type structure. All pressure from the top beam is transmitted direct on to the centre line of the two side columns.

The top beam is of ample depth to resist deflection. Adjustment of the top beam is by a separate flange-mounted motor driving a train of reduction gears working in oil in a totally enclosed gear box to a steel worm and large phosphor bronze worm wheel nut in each connecting rod. A dog clutch is provided so that the top beam can be positioned parallel to the bottom beam. Limit switches are fitted to prevent overrun of the beam either up or down.

The connecting rods are of cast iron and fitted with large diameter phosphor-bronze bush bearings for the eccentric shaft throws. Spherical-ended ball screws of high-tensile steel work in the large solid phosphor-bronze worm wheel nuts for raising and lowering the top beam adjustment. The spherical ball screws are located by high-tensile square-ended pins in the cast steel pressure cups which are carefully fitted for full bearing seating.

The eccentric shaft is hammer forged from a specially selected ingot of 0.45 to 0.50 per cent carbon steel, the one-piece forging having the highest elongation. The forging is fully machined and ground all over except on the side of the eccentric throws. The eccentric shaft works in phosphor-bronze bearings.

The drive is provided by a press-type high-torque type of motor by vee belts, direct on to a flywheel running on ball and roller bearings, mounted on the first motion shaft. A patent multi-plate friction clutch is bolted to a register on the flywheel which operates in conjunction with a brake so that

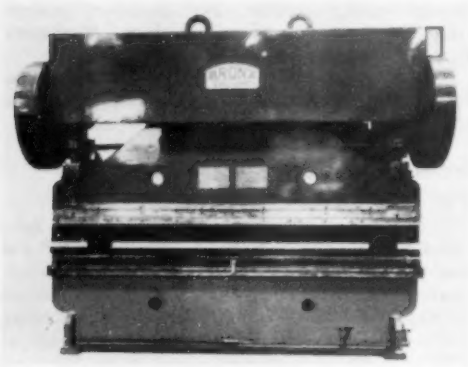


Fig. 5.—90-ton press brake

inching of the top beam can be carried out with complete control by the machine operator. Projecting lugs cast on the brake are used for barring the top beam out of stick-up should this occur due to the operator incorrectly setting the top beam. The second motion shaft is also mounted on ball and roller bearings. All gears are totally enclosed in gear cases and run in oil.

The machine occupies the minimum of floor space because the flywheel is mounted inside the framework of the machine. There is also a clear space inside the frame so that the largest practical sweep can be obtained.

A dial indicator is provided to show the position of the top beam relative to the stroke and lubrication is by battery grease nipple system unless otherwise requested.

The hand-operated brake has capacities of:

16g. mild steel over $\frac{1}{2}$ in. vee opening 24 in.

13g. mild steel over $\frac{3}{4}$ in. vee opening 18 in.

10g. mild steel over $1\frac{1}{8}$ in. vee opening 10 in.

The stroke of this machine is 2 in. and the adjustment of the bottom beam is also 2 in. The frame is of steel construction, comprising heavy one-piece steel side frames, deep section support plate, and top and rear cross members rigidly bolted together. The one-piece deep-section steel plate top beam has phosphor-bronze shoes which work on circular-type steel slides on the side frames. The one-piece bottom beam is mounted on screw-type jacks. Back gauges are incorporated, these being easily adjusted.

The 3-roll pyramid pinch-type plate bending rolls can bend mild steel plate 10 ft. in width by $\frac{1}{2}$-in. in thickness.

This machine is of entirely new design and permits the bending of plate with the same simplicity as obtained on a standard 3-roll pyramid-type bending rolls and also the long edges of the plate can be pre-formed in the machine prior to

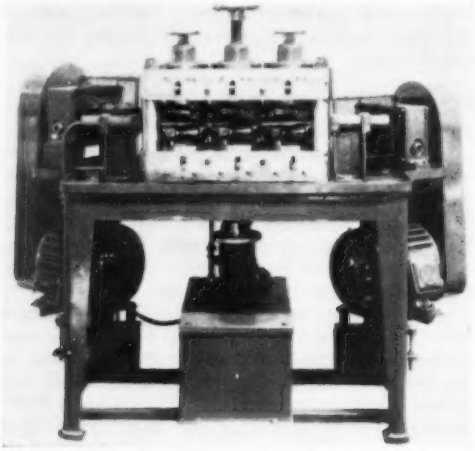


Fig. 6.—Multi-cross-roll tube-straightening machine

rolling without the necessity for taking the plate out of the machine or for pre-forming by separate operation under a press.

The machine is basically a 3-roll pyramid-type bending rolls having the rolls in "pyramid" formation but the top roll runs idle in a fixed position, the bottom rolls being driven and provided with vertical adjustment so arranged that both rolls can be adjusted independently and simultaneously. The two bottom rolls are driven through universal couplings from the main gear box.

The swinging down of the bearing housing and the balancing of the top roll have a combined mechanical operation initiated from a 3-h.p. motor.

Large indicator dials are fitted at the drive end of the machine to register the movement of the bottom rolls and electric limit switches are fitted to prevent damage to the machine should the bottom rolls be accidentally over-run either up or down. The main housings are of heavy fabricated steel construction.

The machine is also fitted with vertical rolls to assist in conical rolling and indicator plates are mounted on both housings to register the bottom roll position for conical rolling. The roll necks extend outside the housings on the swing-down end of the machine and fitted with overhung rolls for the bending of angles and sections.

The Carborundum Co. Ltd.

Stand 322, Grand Hall, Gallery

This company will be exhibiting on their stand a range of products including latest developments of cutting-off wheels, segments, depressed centre wheels, high-speed resinoid wheels and diamond products.

Ceramic cutting tools composed of virtually pure aluminium oxide will be featured. These tools possess extreme chemical inertness and therefore cannot weld to the workpiece. They combine great hardness and high abrasive resistance which reduces tool wear, and their chemical and physical properties are retained up to red heat—conditions under which orthodox tools fail rapidly. As a means to increasing productivity and reducing machine costs they are invaluable to the tool engineer.

A representative range of coated abrasives will be shown along with '61' Contact Wheels, FLEX-BAC Pads and PORT-A-BELT grinding attachments.

Silicon carbide and ALOXITE grains and powders for the buffing, polishing and optical trades will be displayed together with tumbling nuggets. ALOGRIP non-slip flooring compound which is supplied in two grades and a variety of colours and which can be applied to almost any existing surface will be shown.

Charles Churchill and Co. Ltd.

Stand 213, *Empire Hall*, *Ground Floor*

In addition to a number of machines for the production of gears, the company is showing a machine for producing finishes of the order of one micro-inch. It is the Superfina SM 80 Centerless superfinishing machine, which is being shown as an example of the range of machines produced by Wieck and Hentzen.

The throughfeed system ensures maximum production and the unique features of the machine guarantee continued quality of finish with ease of operation.

The oscillating head is air operated and incorporates a balancing device to obviate vibration. The transport rolls have infinitely variable speeds and the setting of these rolls is accurately and speedily controlled by means of a hand wheel. The form of the rolls ensures an absolutely straight line pass of the workpieces through the machine. An air-operated pressure roll is fitted at the infeed position to assist the components to rotate before passing under the first stone. Arrangements are made to impart a constant stone contact pressure even with a fluctuating supply. A filter unit with pump, fine filter and magnetic filter unit provides sludge-free lubricant to the stones. An electrically controlled sensing device works in conjunction with the pressure roll to stop the machine automatically when the supply of workpieces ceases and the stone guides are automatically withdrawn.

The machine exhibited is arranged to superfinish gudgeon pins.

A basic operation in all engineering is the production of holes but this has perhaps made less advance than any other. The key to the problem has been the drill itself.

The advent of the Cincinnati Spiropoint is the first major improvement in drilling in 100 years. The new point geometry eliminates the chisel edge and ensures accuracy in positioning rounder holes and reduced drilling pressure. It renders reaming unnecessary and eliminates centre punching. Increased drill life and straighter holes automatically follow its use.

The machine on show has been designed to produce such a point and setting up for grinding has, as well as the grinding itself, been made a simple, speedy job.

The wheel truing device is rapid in action and simple to operate. A built-in dust collector is provided and the machine is mounted on castors and fitted with screw jacks for levelling purposes.

George Cohen, Sons and Co. Ltd.

Stand 21, *Grand Hall*, *Ground Floor*

Three new RASKIN presses will be shown on this stand. The first is the Type 7S high-precision open-front rigid geared press which has a capacity of 120 tons. The stroke is adjustable from $\frac{13}{10}$ in. to $4\frac{3}{4}$ in. and the table size is $39\frac{3}{8}$ in. by $39\frac{3}{8}$ in. This machine, which is fitted with a rolling-key clutch, operates at 50 strokes per min.

The Type C150 IH high-precision open-back geared inclinable press is also new. It is fitted with automatic roll feed and a centralized lubrication system. The ram balance is pneumatic and an air-cushion is fitted, and the frame can be tilted hydraulically. The press, which is fitted with an electro-pneumatic disc clutch, has a capacity of 150 tons and operates at 40 strokes per min. The adjustment is $\frac{3}{4}$ in. to 8 in. and the table size is $47\frac{1}{4}$ in. by $33\frac{1}{2}$ in.

The third new Raskin press to be shown is the Type 45 IB high-precision open-back inclinable press with a capacity of 45 tons and a stroke adjustment of $\frac{1}{2}$ in. to 5 in. Fitted with an electro-pneumatic disc clutch, this machine strokes at up to 200 per min. and has a table size of 28 in. by $18\frac{1}{8}$ in.

Two further Raskin presses will also be shown, *viz.*: the Type 751BA open-back geared inclinable 75-ton machine, and the Type 413 open-front 50-ton rigid horn press.

Two machines from the RUSHWORTH range to be on the stand are a guillotine and a press brake.

The guillotine will be the 8/25 overcrank high-speed machine with a capacity on mild steel of 8 ft. by $\frac{1}{4}$ in. at 60 strokes per min. Of steel plate construction, the drive is by worm gear with an electrically controlled multi-jaw clutch. There is a mechanical plate hold-down and standard gauges incorporating a screw-operated back gauge are fitted.

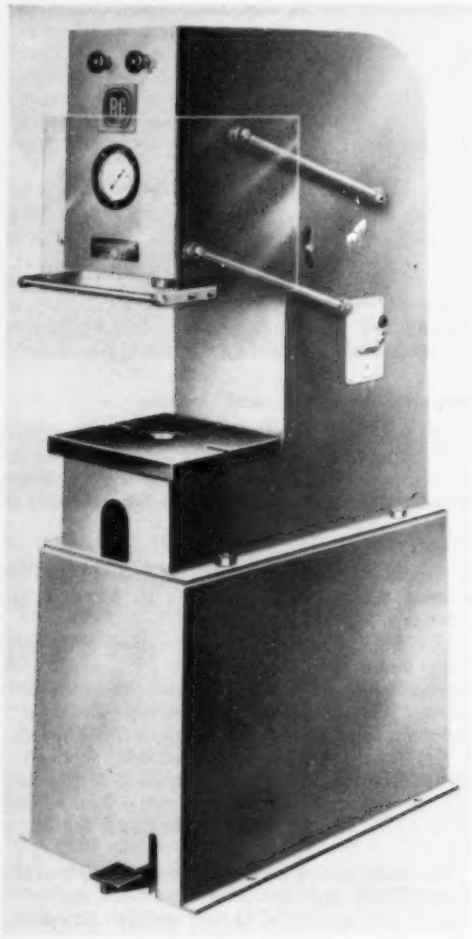


Fig. 7.—R.G. high-speed 5-ton hydraulic press

The press brake is the 75/8 type, capacity 75 tons and capable of forming 8 ft. by $\frac{1}{8}$ in. mild steel. The distance between the uprights is 97 in. and in addition to the electric motor drive there is separate power elevation for the ram. From the main motor the drive is by twin gears and the machine is fitted with a solenoid-operated pneumatic clutch.

Three BARNES machines will be exhibited, one of these being an open-throat hydraulic press brake of the upstroking type. This range of machines was described in detail in the December, 1958 issue of this Journal. The machine to be shown has a capacity of 6 ft. by $\frac{1}{8}$ in. mild steel and a variable stroke with a maximum of 8 in. The enclosed base of the machine houses the motor-driven hydraulic pump unit which feeds oil to two cylinders, the pistons of which operate through rams attached to the bottom beam, which incorporates a " squaring " device which prevents the bottom beam from diverging from the horizontal if forming operations are being carried out at the ends of the beam. The hydraulic pressure can be adjusted from zero to maximum and a relief valve prevents the machine from being overloaded.

The two other Barnes machines to be shown are the balanced-type power-operated plate-bending rolls with a capacity of 6 ft. by $\frac{1}{8}$ in. mild steel, and a new machine—a 100-ton downstroke gap frame hydraulic press. This machine has a variable stroke and is arranged for continuous or single stroking.

A further exhibit will be a WEYBRIDGE 48-in. medium gang slitter with plain ingoing and outgoing feed tables. This machine can be used for edge trimming and multiple cutting of sheet for the production of strip and square and rectangular blanks.

Alligator shears of ELDAIR design will also be shown, one of which is new. This is the No. 3 heavy-duty static machine.

Desoutter Bros. Ltd.

Stand 502, *Empire Hall, First Floor*

On this stand will be shown a complete range of portable pneumatic and electric power tools.

These include tools for drilling, screwdriving, nutrunning and grinding, both in conventional form and for special applications.

One of the newest is a semi-automatic multiple stud runner—of particular interest to the automobile industry.

There will also be a working demonstration of the applications of some of the tools in industry.

Dowding and Doll Ltd.

Stand 123, *National Hall, Ground Floor*

On show for the first time will be the British R.G. range of hydraulic presses with capacities from 5 to 15 tons. Typical of the range the 5-ton model (Fig. 7) has been specially developed to speed up blanking and piercing, forming and bending, clipping, marking and assembly operations.

The unique accumulator system provides rapid ram advance with instantaneous speed reduction and the application of full pressure immediately the load is applied. The double-acting cylinder and ram provide positive 2-ton power return.

The 5-ton model can be supplied for bench mounting or with pedestal for floor mounting and, if required, for foot operation also.

Made solely for " D & D " the R.G. 5-ton press is entirely self-contained, all operating mechanism, pipe work and control rods being enclosed within the robust fabricated frame.

Setting is simple. Working pressure and slow ram advance for setting are controlled by a conveniently placed regulator, a pressure gauge and isolating valve being provided. Pressure can be maintained over short periods, and this time can be extended with simple special equipment. The ram is prevented from rotating by a spring-loaded plunger and the stroke is readily adjustable. High ram speeds—1,000 in. per min. approach, 35 in. per min. pressing and 650 in. per min. return—permit the press to be operated rapidly. Both the table and the ram nose are designed to accept most existing tooling. A Perspex guard is available.

Brief Specifications

5-ton Model

Capacity	5 tons.
Maximum ram stroke	4 in.
Throat depth	7 in.
Height, table to ram	12 in.

10-ton Model

Capacity	10 tons.
Maximum ram stroke	8 in.
Throat depth	9 in.
Height, table to ram	16½ in.

15-ton Model

Capacity	15 tons.
Maximum ram stroke	10 in.
Throat depth	10 in.
Height, table to ram	19½ in.

Also on show will be two British Wiedmann turret punch presses Model RA 41P and R61.

Model RA 41P is a power-operated press especially suitable for piercing work on the longer runs. It has been developed for maximum production with minimum handling of the work.

The apertures to be pierced are located from a master template by means of a pantograph table with depressible stylus which can be operated exceedingly rapidly.

The templates themselves can be made on the same machine.

All template holes, irrespective of their size or shape in the finished work, are pierced ¼-in. diameter, since only the stylus enters the template.

Template and blank are clamped in position with their datum edges against stops. As the stylus moves over the template the blank moves under the punch. Each time the stylus enters a template hole and is fully depressed, the press trips.

Coloured code lines painted on the template link all similar work apertures and by following the routes so formed, turret and work movements are reduced to a minimum. Flags of the same colour on the turret indicate the appropriate punch.

Up to 3 in. diameter can be punched in 0.074 in., 28-ton tensile mild steel plate.

Brief Specification

Throat depth, 28 in.

Table size, 24 in. by 24 in. Also available with 40 in. by 28 in. table.

16 turret stations.

Pressure capacity, 30,000 lb.

Maximum punch diameter, 3⅛ in.

1-h.p. motor.

Model R61 (Fig. 8) is a heavy-duty press designed for rapid, accurate and economical piercing of blanks up to 100 in. by 60 in., with minimum handling of the material.

No marking out is necessary, all apertures being located by co-ordinate settings, read at a glance from direct measuring counters.

Rotation of the turret, which is by power, is controlled from the operating position and the press cannot be tripped between stations.

The blank is clamped with its front edge in contact with location pads and its right-hand edge against a stop. It is positioned relative to the punch by means of two handwheels, one controlling in-out and the other lengthwise dimensions.

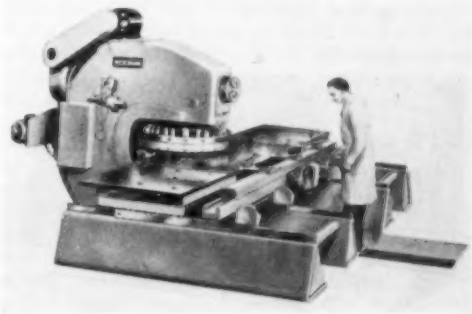
The exact dimension from each datum edge to the punch centre-line can be clearly seen on the two direct reading counters, and over each handwheel.

A co-ordinate chart at the front of the table indicates the settings for each aperture and the turret position. When the press is tripped the chart moves on to show the next settings. Alternatively, for short runs settings can be made direct from the drawing.

Large diameter anti-friction balls inserted in the table surface permit easy manipulation of the work.

Up to 6-in. diameter can be pierced in ⅛ in., 28-ton tensile mild-steel plate.

Fig. 8.—British Wiedmann turret punch press, R.61



Drummond-Asquith Ltd.

Stands 42 *and* 43, *Grand Hall, and Annexe*

A range of Hi-Ton presses will be on this stand including a 50-ton hydraulic machine, a 4-ton bench press, a 12-ton machine fitted with indexing table and a 75-ton press with hydraulic straightening equipment. Also on show will be a Hi-Ton 350-ton cold forging press.

Hi-Ton hydraulic presses for deep drawing are available to any specification regarding tonnage and physical size up to 150 tons for the main ram or punch slide and with a maximum depth of draw of 12 in. Double column and open-throat types are available and pressure is infinitely variable from 10 per cent to maximum. The open-throat types (single action) can be fitted with a bottom cushion ram and the double column machines are supplied with single or double action and with or without bottom cushion ram.

F. J. Edwards Ltd.

Stand 8, *Grand Hall, Ground Floor*

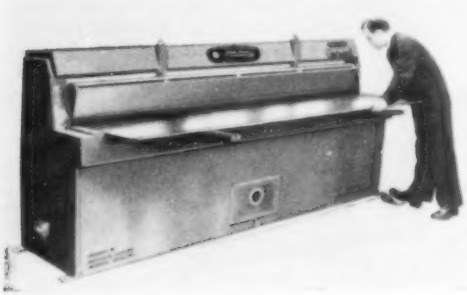
A wide range of machines of interest to the sheet metal industry will be exhibited on this stand.

Fig. 9 shows the Besco Truecut guillotine, which is supplied in two sizes with capacities 8 ft. by $\frac{1}{8}$ in. or 8 ft. by $\frac{1}{4}$ in. The machine is of all-steel construction with electrically-operated friction clutch and magnetic brake. The machine also has automatic holddown and a precision back gauge.

Fig. 10 shows the Besco-Truebend press brake, Model 60/120, of 60-tons capacity and of all-steel construction. The forming capacity between side frames is 8 ft. by $\frac{1}{8}$ in. vee die and, over full die length, 10 ft. by 12 s.w.g., $\frac{7}{8}$ in. vee die. The machine is motor-driven with treadle-operated disc-type clutch.

A box and pan press brake will also be shown. This has a forming capacity in mild steel up to 48 in. wide by 12 s.w.g. over $1\frac{1}{4}$ in. vee die, and has a swing-out beam for forming and removing complete trunk sections or alternatively a deep beam comprising a number of removable fingers for the forming of deep trays in one piece of metal.

Fig. 9.—Besco Truecut guillotine



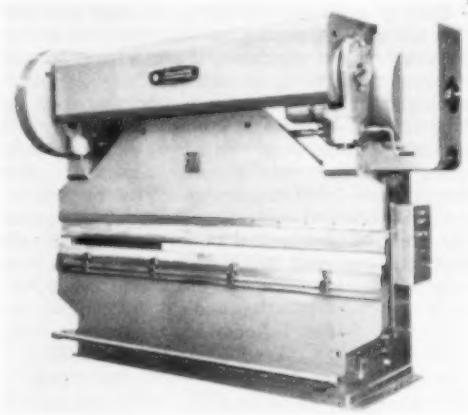


Fig. 10.—Truebend press brake

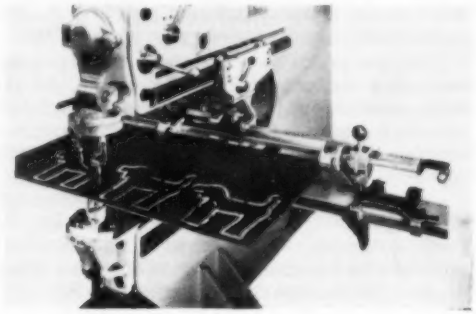
The Besco plate bending roller, Model TRP8/25 to be shown, has a capacity of up to 8 ft. by $\frac{1}{4}$ in. mild steel, but there is a smaller model which has a capacity of 4 ft. by $\frac{1}{4}$ in. Drive in these machines is by electric motor through a worm-gear reduction box.

Another interesting machine for which this firm are the agents is the Trumpf universal copy nibbling, shearing, flanging and forming machine, Fig. 11. This can be used for copy nibbling from templates by the co-ordinated use of a tracing arm or for normal cutting straight or curved shapes, internally or externally, beading, folding, etc. The depth of gap is 59 in. and the capacity for nibbling is 0.16 in. mild steel.

A new machine is the Besco all steel horizontal section rolling machine. This has a capacity for angles (leg out) of $2\frac{1}{2}$ in. by $2\frac{1}{2}$ in. by $\frac{3}{8}$ in., the smallest dia. being 24 in. The capacity with leg in is 2 in. by 2 in. by $1\frac{1}{4}$ in., the smallest dia. being 18 in.

Other machines to be exhibited include an all-steel box and pan folding machine (Model BP414),

Fig. 11.—Trumpf nibbling, shearing, flanging and forming machine



an all-steel treadle guillotine (capacity 48 in. wide by 16 s.w.g.), motorized swaging, wiring and jennying machine (Model E.14), a Trumpf shearing, nibbling and flanging machine (Model TAS42 1050, a Besco automatic folding machine (capacity 98 in. by $\frac{1}{8}$ in.), a Besco universal double-ended punching, shearing, section cropping and notching machine (Model KBL13) and KALTENBACH sawing machines.

Electric Resistance Furnace Co. Ltd.

Stand 6, *Grand Hall, Ground Floor*

The exhibits of the Electric Resistance Furnace Co. Ltd. will include new atmosphere generating equipment, a brazing paste applicator, and a new small size, closed quench furnace.

The new EFCO furnace is a compact, inexpensive unit for carbonitriding, gas carburizing and hardening processes. It increases the range of horizontal, closed quench furnaces and offers to manufacturers, for the first time in this country, an economical unit for the smaller volume of work. The furnace is heated by electric, radiant tube elements operating at mains voltage, and the controlled atmosphere is obtained from a liquid hydrocarbon drop feed unit.

The general design of the furnace is similar to that of the larger furnaces, an outer door giving access to a water cooled purging chamber and an inner heat-insulated door giving access to the horizontal heating chamber. Both doors are operated by air cylinders and the outer door is fitted with a gas screen. The purging chamber accommodates the single-deck quench elevator used to lower the work into the oil quench tank. The oil is water cooled and is circulated by an electrically driven agitator. The heating elements are positioned on the walls of the furnace chamber, and below the hearth, and a fan, driven by a water-cooled electric motor mounted on the roof, circulates the furnace atmosphere and speeds the heating.

The new furnace accommodates a work basket 14 in. long, 8 in. wide and 8 in. high.

New controlled atmosphere equipment will include an endothermic atmosphere generator with an output of only 100 cu. ft. an hour, and a mixer for the precision mixing of gas and air for use in atmosphere generators.

The EFCO brazing paste applicator (Fig. 12) is a single unit designed to save time, labour and material when applying Efco Park " Quick-Braze " and other brazing materials used in paste form. It consists of a sheet metal cabinet housing a foot switch, air line and a paste container, and providing a working surface 3 ft. high. It is arranged for connection to a compressed-air supply. The paste is forced through a nozzle, mounted vertically above the top of the cabinet, by the operation of the foot pedal.

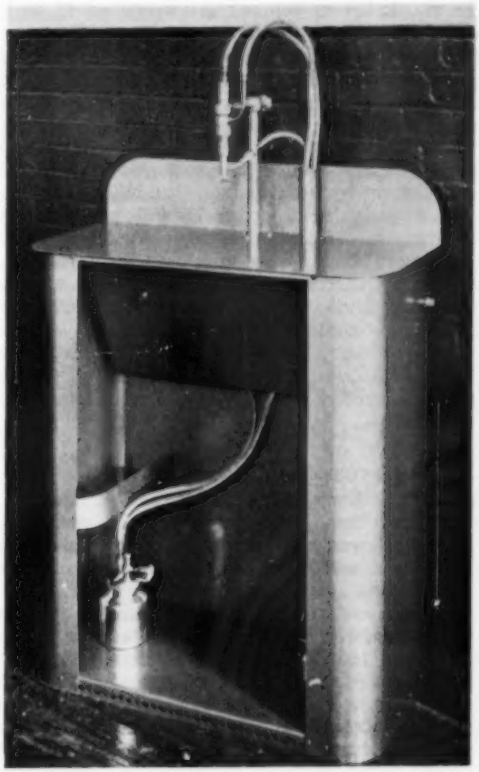


Fig. 12.—*EFCO brazing paste applicator*

Elgar Machine Tool Co. Ltd.

Stand 122, *National Hall, Ground Floor*

The company will have a total floor area of 6,250 sq. ft. and will be showing about 50 machines, ranging from small drilling machines to a heavy-duty crankshaft grinder. Of particular interest will be a new machine, the Bohner and Koele " Hycoform " hydraulic spinning and flow forming lathe, type D35H. One of the features of this machine is that it is fitted with an hydraulic copying attachment. It has a centre height of 13¼ in. and a distance between centres of 40½ in. The longitudinal traverse of 15¾ in. and a cross traverse of 6 in. are hydraulically operated and are infinitely variable. Spindle speeds vary from 45 to 1,200 r.p.m.

Also being shown is the Droop and Rein FS130ku copy milling and die-sinking machine. Its 79 in. table diameter and the traverses, longitudinal 55 in. and transverse 25½ in., make this machine ideal for many applications where rough milling with heavy cuts and subsequent finish copy milling without reclamping, are required. There are 18 spindle speeds available between 20 and 1,000

r.p.m. It has an approximate weight of 12 tons, and requires a 30-h.p. motor for the spindle drive.

Four other machines which are of interest to this journal will also be shown on this stand; they are Mas Model VRM. 50A. portable universal radial drilling machine, for heavy engineering, assembly shops, bridge building, boiler construction, and ship building yards; Mossner Model SSF.950 heavy-duty bandsawing and bandfiling machine with a special high speed of 7,500 ft. per min. and is available for fusion cutting; Model SSF.420 high-speed bandsawing and bandfiling machine, and the Qualitex Model C.2.ter., spark erosion machine, fitted with a vertical attachment for producing various shaped openings or with a circular rotating formed electrode for producing form tools and components using the surface grinding method. It also has a built-in control oscilloscope.

E.M.I. Electronics Ltd.

Stand 608, *Empire Hall, Second Floor*

A new low-priced tape-controlled electronic positioning system, which has a nominal electrical accuracy of one part in 400,000 will be shown for the first time at an exhibition.

Known as the Emicon 400 positioning system, it positions heavy workpieces on medium and large machines, and does not need a specially designed table. Speeds up to 300 in. per min. can be controlled by the system, which measures the rotation of a lead screw or pinion, and is readily adaptable to many existing machines.

The system is ideally suited to applications such as the drilling of girders and boiler plates, and for use in sawmills.

The datum point can be located anywhere in the travel of the workpiece, and a more comprehensive range of instructions than usual can be programmed on the tape.

Another automation aid to be demonstrated for the first time, on the E.M.I. stand, is the company's new large dynamic balancing machine, which checks the degree of unbalance in high-speed turbines, large armatures and other rotors, up to 250 lb. in weight. The use of a new type transducer and a new technique in cradle suspension enables a bearing displacement of 8 micro-inches to be readily detected. This is the most accurate balancer at the price on the market.

Among other exhibits on the E.M.I. stand will be a display of rotary and linear Emicon inductor micro-positioning devices for machine tool control, and samples of workpieces in two and three dimensions. A two-dimensional control cabinet and the latest type of Creed teleprinter will also be on show.

Several of the leading machine tool manufacturers will be showing machines fitted with E.M.I. control equipment, on their stands in other parts of the exhibition. Some of them will also be using E.M.I. closed-circuit television systems to enable visitors to observe the accuracy of their positioning tables through auto-collimators.

Firth Brown Tools Ltd.

Stand 312, *Grand Hall, Gallery*

The company will be displaying their full range of engineers' cutting tools; drills, reamers, milling cutters, Mitia carbide tools, Zeelock and type 3 inserted blade cutters, taps and all types of screw thread tools, the Insto segmental circular cold saws, hacksaws, engineers' and saw files and milled tooth files, wood saws, and shear blades.

In addition they will be demonstrating the Speedicut "Chipbreaker" drill. This patented drill offers the attractions of chip control without any special re-point grinding. The design of the drill gives increased rigidity, enabling the use of higher feed rates and increased life between regrinds.

The Hardometer hardness testing machine and a sharpening machine for circular saws with Mitia carbide tipped teeth will both be under demonstration.

Funditor Ltd.

Stand 326, *Grand Hall, Gallery*

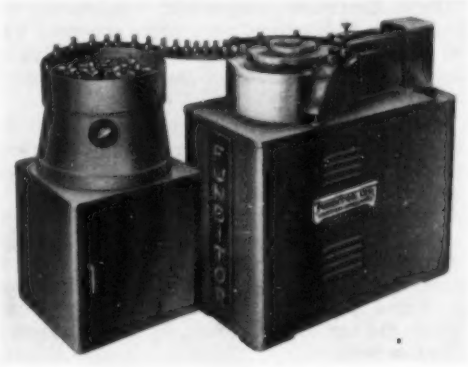
Machines on view will show the latest developments in mechanical marking, sand-blast marking (Sand Jet), embossing, blocking with pigmented foil and electrolytic etching. The diverse marking techniques employed by Funditor Ltd. cater for the marking of practically any material.

New items, which will be exhibited for the first time, include :—

Planetary Marking Machine

This high production automatic marking machine (Fig. 13) is one of a series which has been developed for "flow-production" marking. This particular model will be seen working with a hopper feeding

Fig. 13.—*Planetary marking machine*



unit supplying a steady stream of sparking plug bodies to the machine which operates at high speed. Further machines have been designed for production marking of ball pins, ball race tracks, flanges, and similar components.

Light-Duty Hydraulic Marking Machine

A fully hydraulic machine equally suitable for mass-production marking or general-purpose marking. A single foot control operates the machine automatically for either single or double stroke cycles and, for deep marking or light knurling a repeat marking device allows continuous cycling for as long as the foot pedal is depressed. This machine can also be supplied with a contour valve for marking of irregular shaped components.

Electrolytic Marking Equipment

This portable equipment produces good results where mechanical marking is not admissible, and parts of any thickness or hardness can be clearly and quickly marked without fear of stress or distortion. Three types of mark can be obtained, *i.e.*, plated, etched and black oxide, and the equipment incorporates a pulse counter giving depth-controlled etching.

Further exhibits will include :—

Heavy Duty Hydraulic Marking Machine for deep marking tough materials and for knurling on round or flat units such as shafts of fractional h.p. motors, starters and dynamos, etc.

Pneumatic Bar Marking Machine with feed and discharge rollers, for marking bar material for stocking purposes. Also used by scaffolding manufacturers for the marking of steel and aluminium alloy tubing.

Sand-Jet Marking Machine developed for marking precision parts whose marking by other methods is impracticable. Will permanently mark glass, hardened steel, stainless steel, carbide, ceramic, plastic and delicate thin-walled parts.

Hand Lever Operated Bench Machine for marking small components.

Treadle Marking Machine with hand and foot operation.

Pneumatic Marking Machine with pneumatically-operated table.

Pneumatic Hydraulic Machine suitable for mass production marking and can be supplied with various automatic feeding attachments.

Tag Embossing Machine for speedily embossing light-gauge metal shipping or specification labels.

Tape Embossing Machine suitable for embossing 1 to 10 lines of characters into coiled metal strip, punching and cutting-off into labels.

Electric Metal-Marking Typewriter with keyboard action for deep marking metal name and instruction plates.

Another machine, which is being exhibited for the first time in this country, is the Model LS-3600 Automatic Shaving Machine designed to perform facing, turning, grooving, necking, cut-off or burnishing operations on bolts, screws and automotive parts. This fully automatic machine handles components having body diameters up to $\frac{1}{2}$ in. in lengths under head from $\frac{1}{2}$ in. to $4\frac{1}{2}$ in. Production rates of the standard machine vary from 800 up to 2,400 finished parts per hour.

Also on view will be a Supersaw for cutting and trimming plastic, lead alloys and other metal sections or tubes and an Electric Cabinet designed to store welding electrodes.

Paul Granby and Co. Ltd.

Stand 15, *Grand Hall, Ground Floor*

Machines from the WILHELMSBURGER and LASCO ranges will be exhibited by this company, who are agents for both makes of machines.

The Wilhelmsburger 7-roll plate bending and levelling machine to be shown (Type SWV.30/3660) is similar to the 5-roll FWV type (Fig. 14) in main detail but with the addition of two extra rolls. With the SWV machine during straightening the central top roll and the two straightening rolls are positioned above and the two bottom rolls and one each auxilary roll at either side underneath the plate. During bending the four straightening and auxiliary rolls are run down to the lowest position. The three remaining symmetrically-arranged rolls permit pre-bending of the plate. In addition to the two bottom rolls the straightening rolls are also driven. The model on show takes plate 3,600 mm. wide and has a pre-bending capacity of 30 mm. thick sheet. Control of the machine is by pushbuttons.

Other machines from the Wilhelmsburger range will be shown in the form of working models ; these include a ship-plate bending and flanging machine which incorporates the action of a hydraulic press-brake with the action of a bending roll, a 3-roll bending machine with pre-bending facilities and an open-front hydraulic press (Fig. 16).

A scale model will also be shown of a Lasco hydraulic draw press with stamping action (Fig.15).

This machine has a cast steel frame and tie-rod construction, and is capable of very deep-drawing operations, due to the infinitely-variable hydraulic pump, which automatically adjusts the speed of the press during the drawing cycle to suit the conditions demanded. The press is equipped with

Fig. 14.—*Wilhelmsburger* 5*-roll plate bending and levelling machine*

Fig. 15.—Lasco hydraulic draw press

a hydraulic cushion, which can be used as a blank-holder and also for ejection purposes. In addition to the deep-drawing facilities the ram can be made to drop under gravity with either short or long blows, in order to coin or strike the work to produce sharp corners and absolute flatness; also it can be used for embossing operations.

Another machine to be shown is the LASCO short-stroke drop hammer, Model KH.125, which has a 25-cwt. tup and a stroke of 40 in. By combining a heavy tup with a short stroke this machine provides a very high operating speed and, unlike any other drop hammer, it has a hydraulic lift to the tup. On this drop hammer will be a new

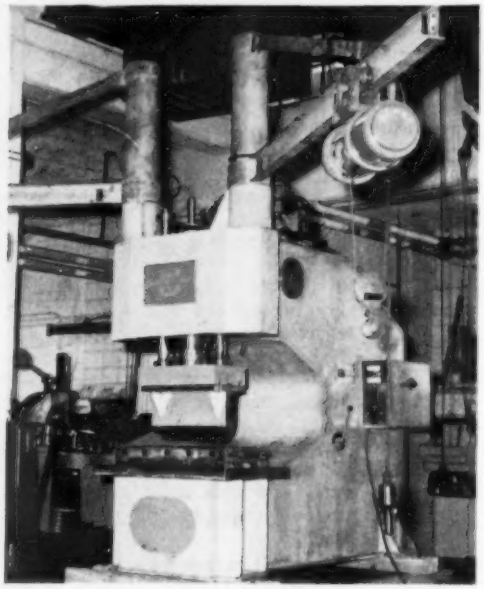


Fig. 16.—Wilhelmsburger open front hydraulic press

Lasco two-height automatic hammer control with instant stroke adjustment. This new feature permits two different drop heights to be pre-set and to be automatically operated by electric foot buttons. Each setting is infinitely variable, so that the stroking is steplessly adjustable over the whole length and the machine can be operated with single blows or with a continuous striking. This new system permits accurate blow control from all heights and is claimed to do away entirely with all the old cumbersome drop hammer controls. Die wear is considerably reduced by avoiding unnecessarily hard blows.

A PEDDINGHAUS billet shear (Model 214/680) complete with feed table will also be shown.

Greenwood and Batley Ltd.

Stand 102, *National Hall, Ground Floor*

Among the exhibits will be the 4-station horizontal transfer cold forging machine. This machine has a heading capacity for $\frac{3}{8}$ in. dia. wire, but is arranged to feed and cut off $\frac{5}{16}$ in. dia. It runs at a speed of 100/120 blanks per min. and produces components up to a maximum shank length of 3 in. with a cut-off length for $4\frac{1}{2}$ in.

The body is of extremely rigid construction and the slide, operated by two connecting rods, holds accurate alignment. It has phosphor-bronze liners sliding on hardened steel slips. The wire is fed through straightening rolls to the feed rolls which are driven by a robust roller friction clutch. The

wire stop is adjustable from the operating position by handwheel. Cut-off and carry-over to the first station is obtained by an open cut-off knife with cam-operated transfer finger to hold the blank. Following a positive cut off, the knife is carried forward under spring pressure, cam controlled, and is positively returned. Subsequent transfers are carried out by fingers operated by rack and pinion. Dies are normally the built-up type, and the punches are separately adjustable in all directions. In addition to die ejectors, punch ejectors are fitted.

The machine is driven by a motor through vee belts on to a flywheel and clutch unit mounted on a high-speed driving shaft. The other end of the crankshaft carries a double helical gear pinion which drives a wheel on the main crankshaft. The machine on show is fitted with a slip ring motor with plug braking running at a fixed speed, but a variable-speed drive can be supplied. Safety features include microswitches fitted to the die ejector stations, transfer mechanism, and punch ejectors, so that in the event of a tooling failure the machine is stopped almost instantaneously by the motor plug brake in conjunction with a powerful band brake on the driving shaft. A 20 station, 4-speed mechanism lubricator with separate motor drive supplies lubricant to all important bearings, surplus oil being drained into a sump and recirculated after passing through two filters. A separate pump feeds coolant to the tools, the lubricating and coolant systems being entirely separate. The machine will be set up to produce $\frac{3}{8}$-in. hexagon head bolts.

Also on show is the $\frac{1}{4}$-in. solid die double blow high-speed forging machine. It will be a standard high-speed model, running at 300 r.p.m. with a production rate of 150 components per min., $\frac{1}{4}$ in. dia. by 2 in. long under the head. Wire feed is by rolling friction clutch with cam-operated cut-off, the cam being mounted on a shaft driven by bevel gears from the main crankshaft. Cut-off and carry over is obtained by an open knife and the blank is held by a cam-operated finger during transfer. A mechanical multi-station pump supplies oil to all important bearings, surplus oil being drained into a sump and recirculated after being filtered. The machine is driven by $7\frac{1}{2}$-h.p. squirrel-cage motor through a vee belt drive on to the crankshaft flywheel.

Last, but not least, is the $\frac{1}{4}$ in. thread rolling machine, the first of a new range of the inclined type with automatic hopper feed. The design retains many of the well-proved features of the standard machine, but there are a number of modifications to give higher speed of working with less movement of the various mechanisms. The machine has a capacity of $\frac{1}{4}$ in. dia. by 2 in. thread length and is running at a speed of 300 per min.

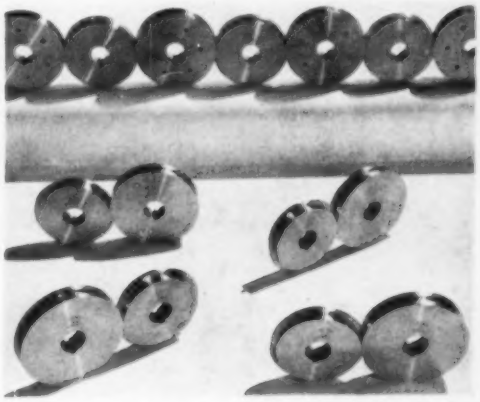


Fig. 17.—Vital X forming rolls

The hopper is of the rotary paddle type and has a renewable lining. All bearings are gunmetal lined and wearing slips are fitted for the main slide to run in and other important bearing surfaces.

Hall and Pickles Ltd.

Stand 617, *Empire Hall, Second Floor*

From the wide range of tool steels manufactured by this company a large programme blanking tool in the company's " Vital " alloy tool steel will be exhibited. This tool has been designed for producing electrical components. " Vital X " can be used for forming rolls, a typical example of which is shown in Fig. 17.

" Hydraspeed " extra heavy-duty cutters, also to be shown, are specially designed to take very heavy cuts and feeds on high-tensile steels and are supplied in a wide range of sizes covering end mills, die-sinking cutters, shell end mills, cylindrical cutters, etc.

Router cutters in " Hydraloy " hard metal and high-speed steel and standard and special die-sinking cutters will also be shown.

A large part of the company's tool works is laid out for the production of special tools, and the display on the stand will be representative of the many types of precision ground lathe tools, Oerlikon ground or form-relieved cutters, etc.

Also to be shown are " Hydra " cutting tools, " Hydraloy " hard metal lathe tools, etc.

Heenan and Froude Ltd.

Stand 100, *National Hall, Ground Floor*

An S.3 Multiform—latest and largest addition to the well-known Heenan range of automatic wire and strip forming machines—will be shown for the first time.

The S.3, specifically designed for the economical and high-speed production of heavier and more

complex strip components, is capable of manufacturing these to a blank length of 12 in., a maximum width of 3 in. and up to $\frac{1}{16}$ in. thick at speeds ranging from 40 to 120 pieces per min.

The production of such large and complex components necessitates increased die space. This is adequately provided for in the design of the S.3, the die area extending to a maximum of 31 in. in length. Facilities for piercing or raising from the front or rear of the strip are incorporated. Because of the heavy forces required in the fabrication of large components, the S.3 is of generous proportions and robust construction.

All four camshafts are inter-geared and a special flywheel incorporated in the drive system to ensure smooth running. The flywheel may be manually or automatically divorced from the machine, by which means the considerable inertia built up in the flywheel does not have to be dissipated by the rotating parts before the machine can be brought to rest. Thus the machine may be stopped immediately—automatically if required. This feature removes the strains and stresses resulting from sudden stoppages and, as in the smaller Multiform machines, the controls may be linked electrically to ensure that the machine is automatically brought to rest under certain conditions, such as short feeding, buckling of strip, running out of stock and the like.

Accurate feeding is essential to the Multiform and special attention has been paid to the design of the feed mechanism. The connecting linkages to the reciprocating feed are in a substantially straight line from the operating crank disc, thus giving a straight through-pull from the crank to the feed and ensuring complete accuracy of feed. The stock is gripped between a pair of flat dies, one of which is mechanically operated by a cam. To ensure that strip up to 3 in. wide by $\frac{1}{32}$ in. thick is securely held, the grip is positively applied and released by a self-contained locking mechanism which avoids strained side thrust on the feed slide. In consequence, less effort is required to move the feed backwards and forwards. The feed slide can be positioned nearer to the ram when using short feeds and thin strip, and the provision of a grip throw-out enables the machine to cycle without feeding during tool setting. A separate grip is provided to hold the strip firmly on the return stroke of the feed side, this being operated by two adjustable cams from the front shaft. Flat-faced dies are used to grip the stock.

Sufficient room has been provided on the bed-plate for two press units as well as the standard front cut-off. The horizontal press is designed with a standard die space of 10 in. and the entire press assembly can be adjusted along the bed-plate to obtain the best working position. A load of up to 30 tons can be obtained on each press, allowing a substantial amount of die work to be carried out.

The machine can be supplied with either one or two rams and in certain circumstances, as when the standard cut-off is not required, a third may be incorporated. In each case, the rams may be operated from the front or rear of the machine, thus permitting the burr on a component to be placed either externally or internally, as required, or to allow for bending or raising from front or rear.

Each of the four slides is individually operated by a separate hardened and ground steel cam, each capable of exerting a force of 6 tons through the slide to the component. The cams are of the pick-off type, split for easy removal, and securely bolted to a keyed-on back-plate. A double cam track is provided on the forward stroke, allowing for a central thrust and an additional thrust on a second roller. An outer track provides positive means of returning the slides.

Unlike previous Multiform models, the design of the S.3's drive system provides for the flywheel to be positioned to the left and rear of the machine. This greatly improves the operator's access to the working parts, notably to the tooling, which can now extend practically the entire length of one side of the machine.

The S.3 is effectively guarded, the guarding consisting of an over-all Perspex cover fabricated in three sections, the two outer parts being hinged to the centre cover.

A Heenan S $1\frac{1}{2}$ Multiform, completely tooled and available for demonstration purposes will also be shown at the exhibition.

Alfred Herbert Ltd.

Stand 36, *Grand Hall, Annexe*

Sheet-metal-working machines of PULLOMAX and FOKKER-ECKOLD manufacture are among the exhibits on this stand.

Pullomax machines can perform a wide variety of operations in addition to straight and circle cutting, including straight and irregular slot piercing, louvring, beading, doming, edge bending, joggling, nibbling and flanging. Special tools to cover a wide variety of applications are also available.

These machines operate by means of a stationary lower tool and a reciprocating upper tool. When shearing operations are carried out the cutters do not pass, but penetrate the metal only approximately $\frac{1}{3}$ of the thickness to the breaking point, thus leaving a smooth perpendicular edge which requires no finishing. The principle of operation makes possible the cutting of smaller radii and irregular designs.

The strongly designed frame of welded steel plate is of box section. Working mechanism is fully enclosed and working in oil. Stroke variation is

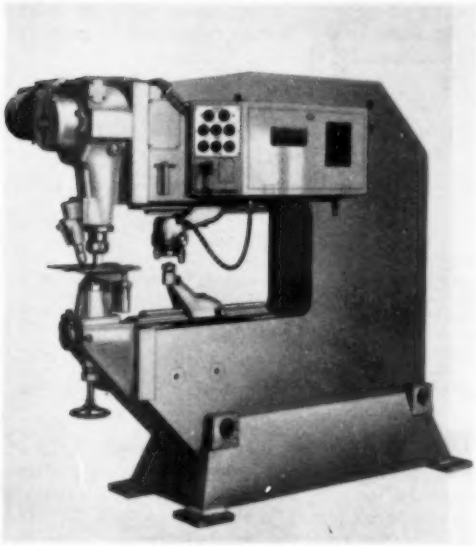


Fig. 18.—*Pullomax U*10

by hand lever which is positioned in front of the workhead. On the larger models a range of strokes 500 to 2,000 per min. is easily obtained.

Tool changing is extremely simple and rapid and calls for no special skill on the part of the operator.

On show will be the Model P1 which has a capacity of $\frac{1}{4}$ in. in 25 tons per sq. in. mild steel, the Model P5 (Mk. II) with a capacity of $\frac{7}{32}$ in., the Model P7 with a capacity of $\frac{5}{16}$ in. and the Model U10, with a capacity of $\frac{13}{32}$ in. plate.

The Pullomax leveller, also on show, is designed for the rapid bevelling at 30 deg. or 45 deg. angle on medium-tensile mild steel, stainless steel and aluminium sheet with single or double vee groove, as required.

Bevelling is performed by a power driven upper tooth cutter, which cuts and automatically feeds the workpiece, which can be either straight, circular or cylindrical.

Working speed is approximately 33—1 ratio higher than obtained by normal pneumatic tools or gas cutting (approx. 11 ft. per min.) and bevel finish is metallically clean and a perfect basis for every kind of welding.

Two speeds available through vee rope drive and machine motion can be reversed in the event of plate having to be released from the cutter.

The Pullomax Rollmax lock-rolling machine is for sheet metal up to 1.5 mm. thick. By means of rollers the edges of the sheets are progressively folded into the desired shape, the lock being completely finished in one operation. The advantages of the machine will be clear to every sheet-metal

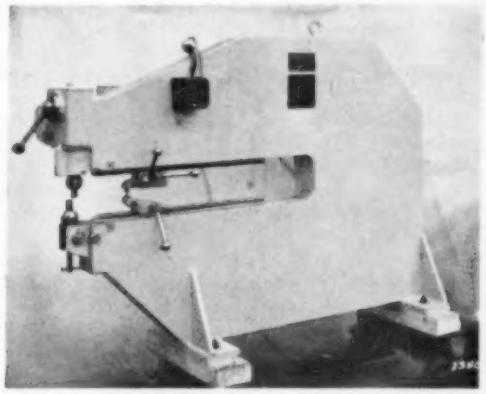


Fig. 19.—*Pullomax P*5

expert from the fact that at least 300 metres of the complicated Pittsburg lock can be run without effort in one hour, even with sheets of varying gauge.

The top and bottom parts are one-piece castings which together comprise the gear case. The box frame, with large doors for inspection of the motor, is built of heavy, welded steel plate. The shafts are journalled in amply dimensioned needle bearings, well protected against flaking from the sheets. All shafts and forming rollers are made from special Swedish steel, hardened and ground. The machine is lubricated with ball-bearing grease, supplied through easily accessible nipples adapted for grease guns.

Each machine is supplied with standard rollers for Pittsburg locks. Rollers for other kinds of locks are available as extra parts.

Shear pins are incorporated in the machine to prevent overloading. A number of such pins are supplied with each machine. The machine can also produce grooved locks and slips.

The Fokker-Eckold range of machines provide a simple and rapid method of cold forming by the process of stretching or shrinking the metal into a variety of shapes.

They are in use extensively throughout Europe by concerns specializing in coach building, naval and aircraft construction, carriage and locomotive work, air ventilation systems, brewery equipment, prototype work of all kinds and shop maintenance.

The general principle of operation is the same on all models—shrinking or stretching workheads are fitted into the ram (which has a reciprocating action) and the anvil respectively, and when the upper and lower jaws come into contact with the workpiece they are deflected horizontally, at the same time gripping the material on both sides and either stretching or shrinking it locally by repeated strokes.

Special tooling is available for profile forming, reforming, pipe reducing, planishing, upsetting

Fig. 20.—Mills press

and flattening, which will take care of most of the usual problems.

The type HF.80 is a hand-lever operated machine working on exactly the same principle as the mechanical models.

It has been found particularly useful in the airframe building workshops for working with small channels, touching up folded edges, the elimination of creases in beaten-out work, the formation of corners, small profiles and elbows.

Sheet metal capacity :—

Aluminium up to $\frac{1}{8}$-in. thickness (3 mm.).
Steel up to 17 s.w.g. thickness ($1\frac{1}{2}$ mm.).
Stainless steel up to 19 s.w.g. thickness (1 mm.).

The Eckold "Piccolo" (Fig. 21) is a small, versatile and mobile machine of medium capacity. It can be easily transported from one shop to the other, thus eliminating the need for repeated journeys for conveyance of components from machine to finishing line.

The design of the machine is such that the complete body can be tilted at any angle to suit the shaping of large-area components, while the shape of the lower holder enables cylindrical forms to be accommodated.

Material	Capacity		
	Sheet	Angles, channels, strips, etc.	
		Up to $1\frac{1}{2}$ in. wide	Up to $2\frac{3}{8}$ in. wide
Deep-drawing-quality steel	16 s.w.g.	14 s.w.g.	16 s.w.g.
Light metals, brass ..	14 s.w.g.	14 s.w.g.	14 s.w.g.
Copper	16 s.w.g.	14 s.w.g.	16 s.w.g.
Stainless steel ..	19 s.w.g.	16 s.w.g.	19 s.w.g.
Titanium, quality 150 and 180, Nimonic, etc.	19 s.w.g.	16 s.w.g.	19 s.w.g.

The type KF.400 has a frame which is fabricated from $\frac{3}{16}$-in. thick steel plates, welded and reinforced at the throat by 1-in. thick plate, is power operated from a 3/2 h.p. two-speed motor fitted in the base via vee ropes to an overhung flywheel which actuates a connecting rod mounted on an eccentric shaft. This in turn operates the ram vertically at speeds of 300 or 600 strokes per min. as required for the component. Pressure to the workpiece is applied by means of a handwheel and foot-operated pedal. Workheads of all types are available in capacities up to a 2 mm. maximum.

Sheet metal capacity :—

Aluminium up to $\frac{3}{16}$-in. thickness (5 mm.).
Copper up to $\frac{1}{8}$-in. thickness (3 mm.).
Steel up to 14-12 s.w.g. thickness (2 to $2\frac{1}{2}$ mm.).
Stainless steel up to 16 s.w.g. thickness ($1\frac{1}{2}$ mm.).

The type KF.653C is designed to accommodate workpieces having a thickness beyond the capacity of the 400 machine, *i.e.*, 2 to 4 mm. in mild steel. Although similar in operation to the smaller machine, many additional features are incorporated in its specification, including remote control to lower ram movement by servo-drive motor *via* tilting foot switch, enabling the operator to handle large-area components ; automatic ram return, and pushbutton control to a multi-speed change-pole motor enabling any one of three stroke speeds to be obtained easily and quickly, *i.e.*, 150, 300 and 600 strokes per min. The top range of 600 strokes is ideal for planishing, finishing and special operations.

Sheet metal capacity :—

Deep-drawing-quality mild steel up to 8 s.w.g.
Light metals and brass up to 6 s.w.g.
Copper up to 8 s.w.g.
Stainless steel qualities up to 11 s.w.g.

The Fokker joggling machine consists of two clamping blocks parallel to each other. The section can be clamped in these blocks with a snug fit with the aid of jaws. By putting the jaws in a conical

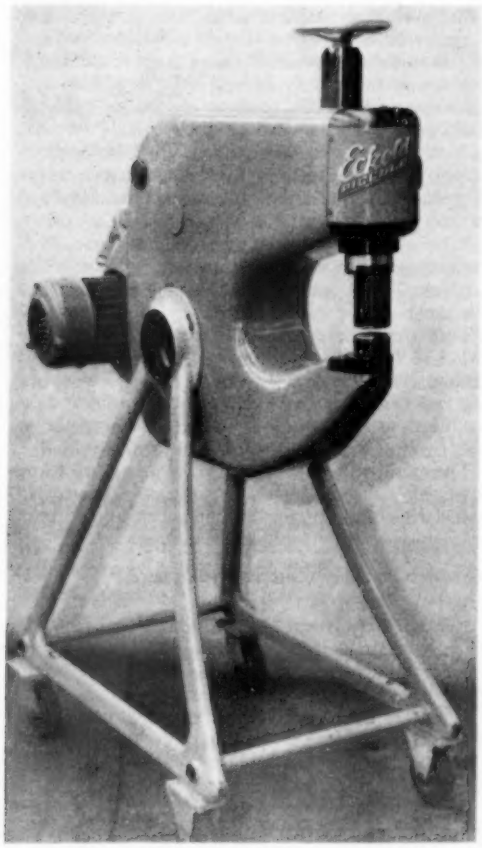


Fig. 21.—Eckold 'Piccolo'

hole of the clamping block the section fastens itself in the jaw during the " joggling " operation.

An arrangement has been made giving the possibility of enlarging the distance between the clamping blocks corresponding to the required length of the " joggle." With the aid of a wedge one clamping block can be lifted with respect to the other, giving the required displacement.

When lifting one clamping block the distance between the clamping blocks is enlarged, giving the necessary stress in the section to ease the deforming. Electronic equipment has been incorporated to regulate the current required for heating the section.

The length of the joggle can vary from 0.04 to 3 in., and the depth from 0 to 0.315 in., the joggling force being variable from 0 to 18,000 kg.

Another Fokker machine will be a bond tester for the testing of joins made by adhesives.

The company are also exhibiting a Mills 6-ton bench press with indexing table and a 15-ton machine with straightening equipment. These presses are available in capacities up to 200 tons. The " Oilaulic" pump is the power unit of these presses. (Fig. 20).

It is a combination of a multi-ram high-pressure unit and low-pressure rotor. These provide two speeds to the ram—a rapid approach which changes automatically to the working speed when the ram contacts the work. If pressure is required to be maintained for more than 15 sec. it is desirable to order a pressure-sustaining valve so as to prevent the hydraulic oil from becoming overheated.

The multi-ram pump is built into its own oil reservoir which is fitted with filter and adjustable relief valve for regulating the maximum pressure applied. The pump body is machined from a solid block of steel, heat treated. The rams are made of chrome-carbon steel heat treated and ground. All revolving parts run in roller bearings. Vacuum DTE light oil is recommended for use in these pumps and presses.

Eight-, 15- and 30-ton presses have rigid, well-braced cast-iron frames. 45-ton and larger presses are constructed from welded steel plate of heavy section. The Oilaulic pump is contained in an oil bath integral with the cast-iron frames and on the fabricated steel frames it is mounted with its tank between the plates. The ram cylinder is also securely held between the side plates.

The pressure exerted by the ram is registered by a gauge on the front of the cylinder. Adjacent and within easy reach is the knob which regulates the pressure applied through an adjustable relief valve. The glands on the ram are not subject to pressure. Ram return on standard presses is spring loaded but power return can be fitted if required. If it is necessary to ensure that the ram does not rotate during its stroke a special fitment can be provided with guides up the side of the cylinder.

Controls are arranged to suit the operating conditions. Generally a hand lever, interconnected to a pedal, is provided, so that either hand or foot can be used to control the movement of the ram. The controls are very sensitive and the ram responds immediately to the movement of the lever or pedal.

Fixtures can be designed and supplied for handling suitable work.

Holden and Hunt Ltd.

Stand 4, *Grand Hall, Ground Floor*

Although occupying only a small stand area, Holden and Hunt will display a selection of 12 machines taken from their standard range and live demonstrations will be given on seven of these machines. There will be four universal pedal-operated spot-welding machines of 5, 10, 15 and 25-kVA. nominal ratings having maximum welding capacities ranging from 2 by 20 s.w.g. up to 2 by $\frac{1}{8}$ in. in M.S. sheet. The 15-kVA. machine incor-

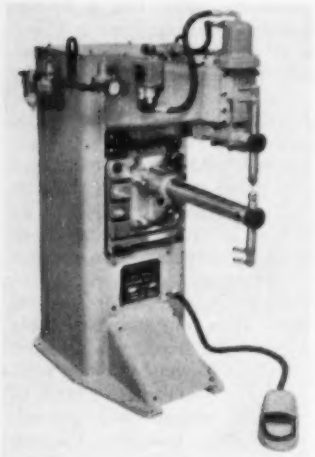


Fig. 22.—Holden and Hunt air-operated spot welding machine

porates an electronic timer and an associated magnetically operated contactor, while all machines will be set up with differing arm and electrode arrangements selected from a large range of standard designs. Air-operated spot-welding machines will be typified by a 15-kVA. rocker-arm design machine (which is one taken from a range complementary to the universal pedal-operated machines) and a 25-kVA. sliding head or press-type spot welder having 18 in. clearance throat reach. Both machines embody controls to give single spot and repeat or stitch welding sequences, the rate of the latter being adjustable to suit welding and production requirements.

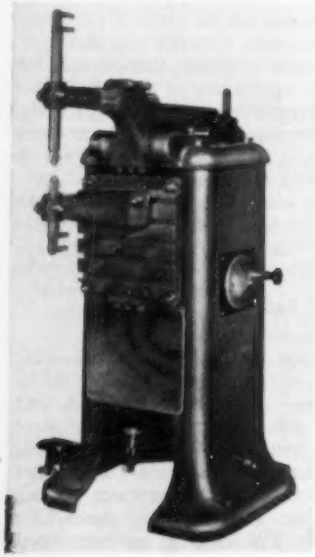


Fig. 23.—Holden and Hunt 15 kVA butt welding machine

Butt-welding machines of 3-, 8- and 15-kVA. ratings will be available for live demonstrations, and the welding capacities range from a minimum of 20 s.w.g. wire on the 3-kVA. No. 1 model up to a maximum of $\frac{1}{2}$-in. dia. M.S. on the 15-kVA. No. 3 machine. All are capable or can be made suitable for butt welding H.S. steels, aluminium, brasses and copper, and each machine illustrates different forms of clamping controls that are available as standard features.

A No. 4 model flash-butt welding machine, with screw-type clamps, has a welding capacity of $\frac{5}{8}$ in. dia. M.S., the machine being the smallest of a range of five such machines.

Two single-head rivet heating machines of 6- and 12-kW. rating to be shown are capable of heating rivets from a minimum of $\frac{1}{4}$ in. by $\frac{1}{2}$ in. long up to $\frac{3}{8}$ in. by 4 in. long, while standard machines are available for heating rivets up to 1 in. by 6 in. long, and one, two or three heads.

The stand will be manned constantly by welding engineers, who will welcome the opportunity of considering and discussing any electric resistance welding or heating problem or proposition.

Hordern, Mason and Edwards Ltd.

Stand 38, *Grand Hall, Annexe*

Exhibited by Hordern, Mason and Edwards will be their range of Rigispeed power presses designed to meet the accuracy of alignment needed to produce intricate stampings requiring relatively short strokes.

They are equipped with an electrically-operated single-disc pneumatic friction clutch with brake and the controls are arranged to provide single stroke, inch and continuous running.

An hydraulic variable-speed gear gives a speed range of zero to maximum and, for toolsetting, it is arranged to reverse from zero to approx. 10 strokes per min.

The double roll feed is friction roller driven and is fitted with a scrap shear, a buckle detector and a stock lubricator as part of the standard equipment.

The press frame is a massive, four-piece construction; the box-type crown, uprights and the bed are keyed and held together by means of four steel tie rods shrunk in position. The crankshaft is of the twin-throw full eccentric type and the slide has four square, bronze lined, adjustable gibs providing rigidity in operation.

The lubricating pump-tank unit, electrical control panel and air supply equipment are housed in the legs of the machine, access to these being through a simple cover fitted with a transparent panel for checking air supply pressures. Lubrication is by gravity flood system, the oil being circulated, drained into a tank, filtered and pumped into the system again.

The OP.30 Isofeed is a new press development by the company and has been designed specifically to

reduce material and tooling costs on blanking and drawing operations on coiled metal material.

Supplied as a complete machine, the OP.30 Isofeed is basically a geared press of the open-front type rated at 30 tons capacity. Used in conjunction with a bow-type feeding unit, the Isofeed itself is a stagger-feed device whereby stock from the bow feeder is positioned alternately at front and rear positions enabling a single tool to automatically produce a double row of components.

The frame is extremely rigid and requires no tie-bars. The OP.30 is fitted with a single-plate friction clutch with a powerful servo-operated brake.

The electrical equipment consists of a B.S.S. totally enclosed fan-cooled motor with a direct-on-line starter mounted on the machine and including push-button operation for single stroke, inching or continuous running operation.

The press will draw a depth of 1 in. max. The fixed stroke is $3\frac{1}{2}$ in. and gives 50 strokes per min.

Three machines from the company's popular OP range of open-fronted presses—20, 55, 75 tons capacity will be exhibited. The frames are of extremely rigid construction requiring no tie-bars.

An important design feature is the massive bearings set at an angle ensuring that the major part of the load is taken directly by the solid frame. The machine has a variable stroke which considerably facilitates certain operations, as the ideal length of stroke can be selected (within the range of variability) to suit any condition. The whole operation of changing the stroke can be effected in less than a minute. All presses in the OP range are fitted with ratchet adjustment to the ball pin. This mechanism combines compact simplicity with rugged construction. The direction of operation is automatically selected immediately the tommy bar is inserted into one of the two holes. Machine sizes 20 to 75 tons inclusive are fitted with an inclining mechanism consisting of an accurately machined square thread screw of ample proportions, turned from high-grade steel and mounted in a substantial steel block. To facilitate inclination, a thrust ball race is fitted, making it possible to incline the press with the minimum of effort. Where air pressure is available at 60 to 100 lb. per sq. in., foot-operated air control gear for actuation of the positive type clutch can be fitted. The pedal which actuates the air control is extremely light in action and reduces operator fatigue to a minimum.

All OP presses are fitted with bolster plates made from high-grade cast iron. There are four or six accurately machined tee slots in each plate which is bored and recessed for the reception of a machined loose bed ring, thus permitting a wide range of dies to be used.

One-shot lubrication is standard equipment on all OP presses. The pump and reservoir unit is fitted

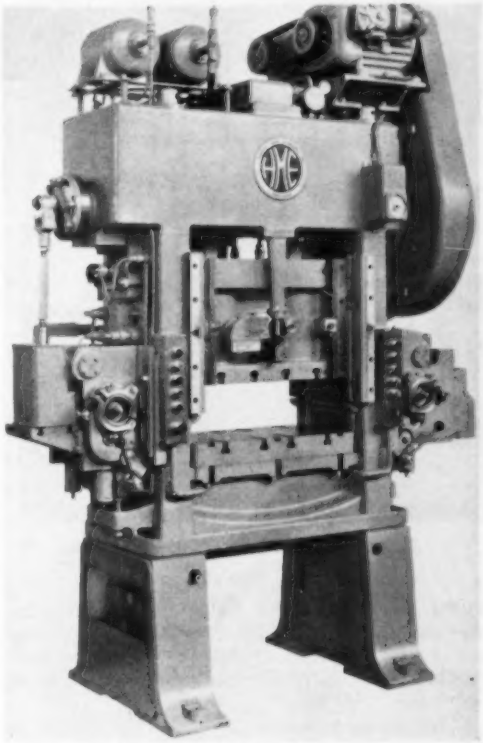
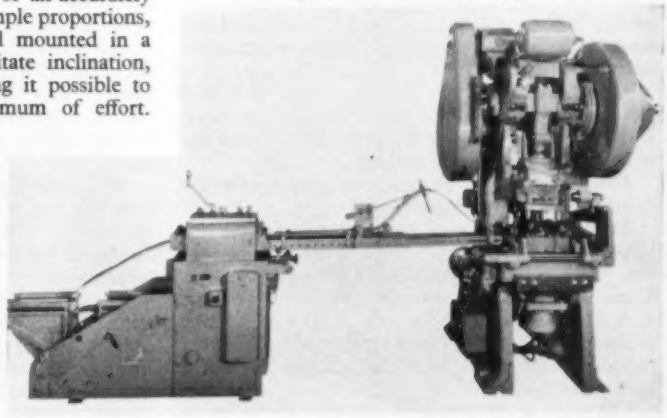


Fig. 24.—H.M.E. Rigispeed power press

Fig. 25.—H.M.E. OP.30 Isofeed



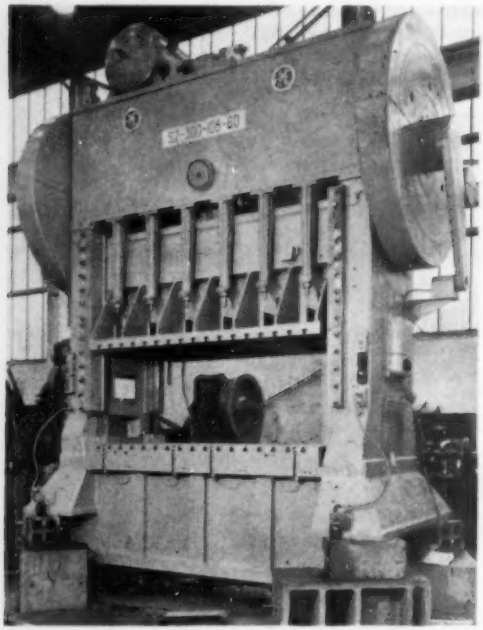


Fig. 26.—H.M.E. DCP.6 double crank press

to the side of the press and the points served by this unit include : crankshaft bearings, connecting rod bearings, ball-pin, slideways and backshaft bearings (the last mentioned on geared presses only).

The company manufacture knuckle presses in four sizes, 100, 180, 360 and 600 tons capacity. This advanced design of machine is all-steel construction, tensile loads being carried within the rectangular member. The machine has extremely long guides and a very fine tool adjustment. All moving parts are automatically lubricated, and the machine is fitted with an H.M.E. clutch and servo operated brake.

All working parts are accessible from floor level for ease of maintenance. The machine is provided with a selector switch to give single stroking, continuous running and inching.

This machine is proving very successful for forming, coining and embossing.

The Hordern, Mason and Edwards DCP.6 is a light-type double-crank press and is a representative machine of its class in this popular range. These machines are one-piece frames reinforced with high-tensile-steel tie rods. The crankshaft is made from a high-tensile-steel forging and the gearing is steel throughout. All bearings are of the best quality materials.

The slide is air balanced and any stroke up to 8 in. can be supplied. The machine is fitted with the H.M.E. non-repeating clutch. All machines in this range are drilled for die cushions and the flexible air-assisted operating pedal makes this a compact and suitable machine for light sheet-metal pressings.

On exhibition for the first time will be one of the new range of double-sided presses, which includes single or double point units with single or double reduction drive gearing, from 100 tons to 300 tons capacity and having effective bed lengths from 24 in. to 108 in.

This range of machines has rugged, four-piece tie-rod frames of fabricated steel design, in the modern box type construction and rectangular lines. Each unit has self-contained patented electric tie-rod heaters for initial shrinking in and for subsequent use for rapid release of the slide in the event of a tool jam. The slides have renewable bronze wear strips at the rear and are contained within the guards at all points of the stroke, while an indicator, face mounted, shows in thousandths of an inch graduations, the amount of adjustment up or down. Included as standard is a crown mounted, clear line stroke indicator and an automatic lubricating unit suitably enclosed with the illuminated visual indicators mounted at eye-level, feeding at pressure to main bearings, and slides ensure reasonable long life and accuracy. The air manifolds for the counterbalance and clutch service are also suitably enclosed, with readily visible pressure gauge dials.

Humphris and Sons Ltd.

Stand 216, *Empire Hall, Ground Floor*

This well-known company are manufacturers of mechanical power presses, mechanical primary and secondary press feeds, strip levellers, coiled strip handling equipment, uncoiling and recoiling reels for stock, and many other types of press shop and rolling mill auxiliary equipment.

On their stand coil handling and feeding equipment will be the dominant theme. There will be three separate displays :—

The first will concern the manipulation, decoiling, flattening, feeding, cutting and stacking of heavy coils of strip material. This display will handle coils up to 5 tons in weight, 36 in. in width, and $\frac{1}{8}$ in. in thickness, and will be an entirely automatic plant.

The second display will be centred around a relatively high-speed automatic punching press of the O.B.I. type and will embrace coil handling, flattening, primary press feeding, stamping and scrap cutting.

The third display will be centred on a new version of a 10-ton endwheel type crank press.

The main display will comprise a 5-ton power lift, power traverse coil car, a 5-ton automatic motorized centring reel, and a 36 in. by $\frac{1}{8}$ in. thick capacity automatic feeding and levelling machine

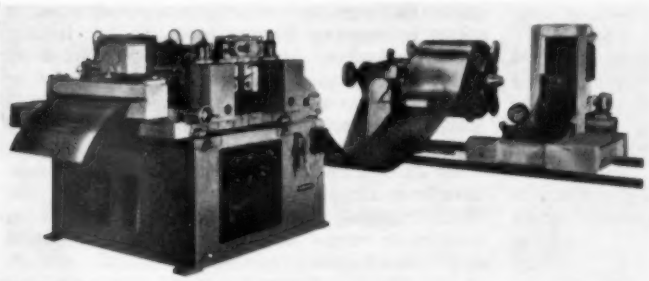


Fig. 27 (left).—Automatic feeding and levelling machine with ancillary equipment

Fig. 28 (below, left).—Another view of the Humphris levelling machine

Fig. 29 (below, right).—Humphris 10-ton endwheel press

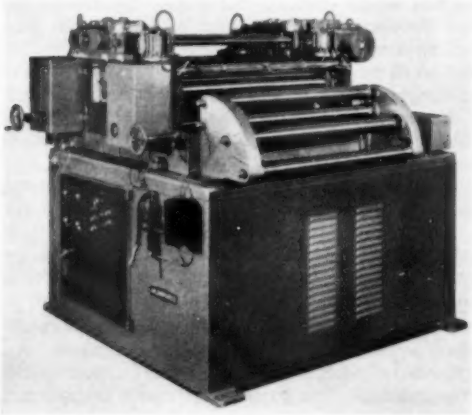
(Fig. 27). In order effectively to demonstrate the equipment, it will be necessary to cut and stack the flattened coil and to this end a proprietary make of guillotine shear will be placed in front of the feeding and levelling machine and the cut sheets will be received on a hydraulic stacking table.

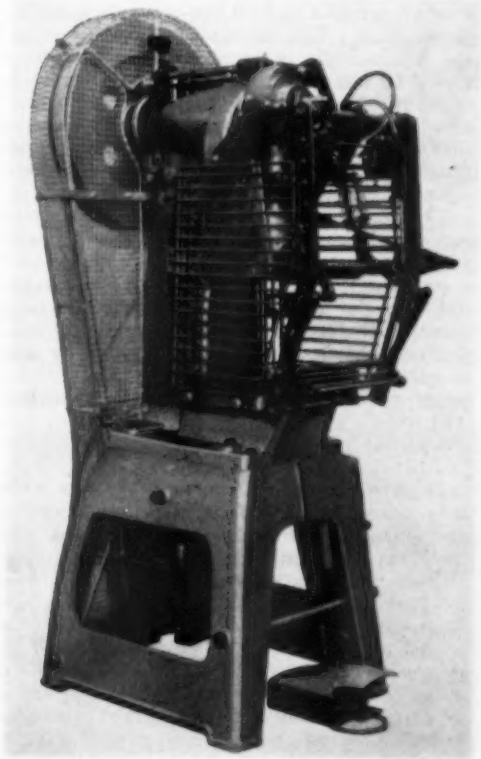
The coil car has a total coil carrying capacity of 11,000 lb. It has a built-in hydraulic power pack, providing the hydraulic pressure for the coil lift, and a geared motor-driven traverse carrying the car along standard section rails which can be mounted above or below floor level. The electric power is derived from a cable connexion, normally attached to the decoiling reel, and the cable is laid into a groove as the car traverses by means of a special cable reel.

The 11,000-lb. capacity automatic motorized centring reel is of the expanding segment mandrel type; at Olympia the mandrel expansion will be arranged manually, although it can be arranged hydraulically. The reel will be arranged with an electric brake and with an entirely new system of loop control.

The automatic feeding and levelling machine (Fig. 28) is capable of handling coiled strip up to 36 in. wide and $\frac{1}{8}$ in. thick. Feed pitch increments up to 36 in. per press stroke can be obtained, and arrangements will be made at the Exhibition to demonstrate the double cycling technique which provides for feed lengths greater than 36 in. The levelling machine incorporates motor screw-down for the levelling rolls, centring lateral stock guides and many other novel features.

The second display will comprise a combined decoiling and levelling machine, Model CD.1000B, Mark II. It utilizes photo-electric cell loop control. The material from this machine will be fed into a 25-ton inclinable friction clutch stamping press fitted with a rack and pinion double-roll feed and crankshaft-driven scrap cutter. A number of entirely new features will be incorporated and the





press will be demonstrated under working conditions.

A 10-ton endwheel press will also be displayed (Fig. 29). This press is a new development of a model which has been extremely popular, well over 1,300 machines having been sold in the last few years. This taller version of the press gives an increased tool height and allows a stroke variation from ½ in. to 3 in. The press at Olympia will be fitted with an air-operated sequential action operator's guard.

E. H. Jones (Machine Tools) Ltd.

Stand 22, Grand Hall, Ground Floor

Included in the exhibits on this stand will be the Lodge and Shipley Vertical FLOTURN No. 12. This machine may be compared with a lathe standing on its headstock. The boss or headstock of the machine contains the spindle and spindle drive, clutch and brake, lubrication reservoirs and pumps, coolant tank and pump and other equipment. The base is a heavy, one-piece casting and the column or bed is another casting, bolted and wayed to the base, with hardened and ground steel ways for the carriage. The column also contains the counterbalance weight for the carriage. The tailstock carries a built-in live centre on a double-acting piston. The carriage has two synchronized and hydraulically actuated roller slides and is moved up and down the column by two hydraulic cylinders. The removable unit roller head on each slide is Timken bearing equipped and provided with an easily replaced roller. Each roller slide has its own hydraulic tracer with precision control valve and template.

The templates are held on an adjustable template support slide with vertical, horizontal and angular adjustments for each template ; a fourth adjustment is provided for the template slide. The template slide and the tailstock are inter-related affording automatic adjustment for variations in blank thickness (blank thickness variations of as little as 0.003 in. may result in unacceptable finished pieces when the variation is not compensated). The spindle is arranged to receive mandrels suitable to particular jobs, which may range up to 12 in. in diameter and 15 in. in length.

By utilizing a 2-in. adjustment in each roller slide assembly, the maximum diameter may be increased to 16 in. An automatically-operated, combined blank centering device and finished part stripper is also provided. Automatic lubrication to slides and ways is furnished. All slides have adjustable tapered gibs to permit maintenance of original accuracy. Coolant for the rollers and workpiece is piped to each roller. Automatic cycle and set-up controls are provided on a convenient console. Movements of carriage, tailstock, template support slide and roller slides are controlled by adjustable trip-dogs, microswitches and solenoid valves determining flow of hydraulic fluid to the various cylinders. Hydraulic fluid is provided by four pumps driven by a single motor ; suitable flow and pressure controls are furnished. All electrical control elements are mounted in a floor-type cabinet.

At the beginning of the cycle, carriage, tailstock spindle and roller slides are fully retracted ; the blank-centering device or loading guide is in position to receive the blank. The blank is placed in position manually (may be automatically loaded). Pressing the " cycle start " button begins the following steps of the cycle :—

(1) Tailstock spindle moves down to clamp the blank on the mandrel ; the blank-centering device retracts ; tracer in-feed and carriage down traverse switches are tripped.

(2) Tailstock and carriage rapid traverse down until the rollers touch the blank. Carriage down traverse stop switch is tripped and the carriage stops momentarily, controlled by time relay. Spindle starts.

(3) Carriage resumes downward movement in feed operation. Hydraulic tracers control the movements of the roller slides, flowing blank to the shape of the mandrel.

(4) At the end of the flowing operation, carriage stop and reverse switch is tripped. Carriage, roller slides and tailstock retract, spindle is braked to a stop.

(5) As carriage retracts, it trips stripper-up switch and the part is removed from the mandrel. Machine is in position for next part.

Among the Cincinnati machines on the stand will be the 9 series by 10 ft. all steel press brake. Features of this machine include remote control for the ram adjustment and automatic cycling control. The transmission is two speed and there is air-electric clutch control with one foot button. A feature of all Cincinnati brakes is centreline loading which contains the forces directly in the end housings. This machine will be shown producing corrugations in 20-g. steel.

Also to be shown is the Cincinnati 1410 all-steel guillotine shear with a $\frac{3}{16}$-in. capacity in mild steel. Features include : light-beam shearing gauge ; slitting gauge ; mitre gauge ; and magnetic sheet support.

A 100-ton dieing press from the C.V.A. range will also be shown.

This model is the largest of the range, the others being 10, 25 and 50 tons capacity, and while the general design follows closely on the lines of the other models, new features have been added.

The machine can be furnished with fixed crankshaft strokes from 1 to 7 in., as required, and extended die-beds can be provided to meet special requirements. The air-operated clutch is controlled

by a solenoid-operated air flow valve. The spring-loaded friction brake ensures automatic braking when the air flow is interrupted and electrical relays ensure stopping at the top of the stroke. The spring-loaded brake will also ensure stopping with safety in the event of the air supply being cut off. This electro-pneumatic arrangement permits the use of a pilot connected to a microswitch which stops the machine in the event of the pilot accidentally fouling the strip, thus reducing the risk of tool breakage.

Power to the flywheel is provided by a 30-h.p. variable-speed commutator motor which is independently supported on vibration damping mountings. Double roll feeds are provided. The input feed unit can be furnished with an automatic positive stop for starting strip, and an automatic stop designed to stop the machine automatically when the end of the coiled strip is reached.

A Wales Strippit Fabricator and Positive Duplicator will also form part of the stand.

The Model 10AA Fabricator is a versatile sheet-metal working machine for rapid and accurate punching, notching and nibbling.

It can be used for punching any shaped hole up to 3½-in. diameter in sheet material up to ¼-in. mild steel; notching 90 deg. corners—rectangular, radii, vee and special shape edge notches up to ⅛-in. mild steel; nibbling straight lines or contours up to a 38-in. diameter circle at 165 strokes per min. up to ⅛-in. mild steel. Punches and dies can be changed from one size or shape to another in less than 20 secs. It is an ideal machine for short or pilot runs, model shop and experimental work.

The Positive Duplicator functions on the pantograph principle and converts the Fabricator to a medium-run production machine for precision work or for cold-punching printed circuit boards without heating, die-making, drilling or deburring. The work is positioned under the punch to reproduce any hole pattern from a template clamped to the Duplicator table.

A comprehensive range of tools, gauges and accessories is available.

The stand will also feature C.V.A. epoxy resins and C.V.A. press tooling.

Keeton, Sons and Co. Ltd.

Stand 221, *Empire Hall, Ground Floor*

This company, a member of the Firth Cleveland Group, will exhibit their range of Keetona sheet metalworking machinery. With the exception of the Keetona 8 ft. by ¼ in. guillotine, all machines will be constructed to Keeton's new modern design in fabricated steel plate, which will be exhibited for the first time.

Entirely new machines on view will be the Keetona 4 ft. treadle guillotine and the Keetona 8 ft. by ⅛ in. power bending roll.

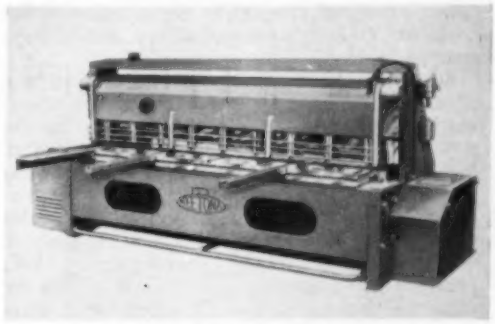


Fig. 30.—*Keetona guillotine*

Working demonstrations will be given on the Keetona 10 ft. by ¼ in. power guillotine with hydraulic hold-down and power-operated back gauge, and on the 6 ft. by ⅛ in. power guillotine. The former machine was introduced in 1959.

Two 8 ft. power guillotines, with capacities of ¼ in. (Fig. 30) and ⅛ in., will also be shown.

A section of the stand will be devoted to the important products of the hollow boring division of the company. This division specializes in the production of hollow bored bars, with emphasis on deep boring for the machine tool, aircraft engine, chemical, petroleum and heavy machinery industries.

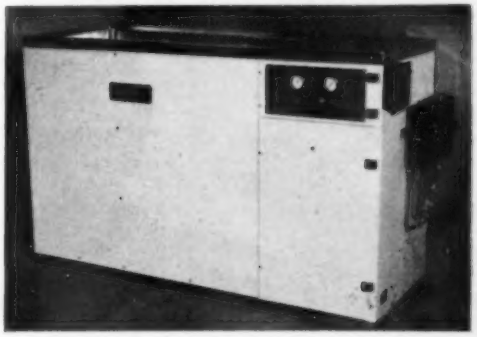
Kerry's (Ultrasonics) Ltd.

Stand 500, *Empire Hall, First Floor*

A chlorinated solvent cleaning cabinet Type USC.4 for use with perchlorethylene solvent will be shown (Fig. 31). The plant is suitable for precision cleaning of engineered components and in many cases the parts to be cleaned can be handled without dismantling, cleaning times are normally 30 sec.

The plant operates at a frequency of 40 Kc/s. with an ultrasonic generator giving 2-kW. peak

Fig. 31.—*Cleaning cabinet, type USC.4*



power. Included is multiple fine filtration of the ultrasonic cleaning section, solvent redistillation and vapour drying.

Aqueous solution cleaning will be illustrated by a cabinet Type USC.3 for use with water detergents, wetting agents, etc. The plant is suitable for the rapid cleaning of engineered components and other items such as opthalmic lenses and frames, printing plates, filter elements, operating theatre instruments, etc. Cleaning times are normally in the order of 30 sec. This plant operates at a frequency of 40 Kc/s. with an ultrasonic generator giving 2 kW. peak power and solution heating is available in the ultrasonic cleaning section. There is also a water rinsing section separate to the ultrasonic tank. In both the ultrasonic and rinsing sections there is a standing waste overflow weir to maintain the level of solution as well as supply continuous replenishment in the tanks.

Other exhibits include the MPD.1 ultrasonic drill for machining hard and brittle materials including glass, ceramics, tungsten carbide, germanium, silicon, etc.

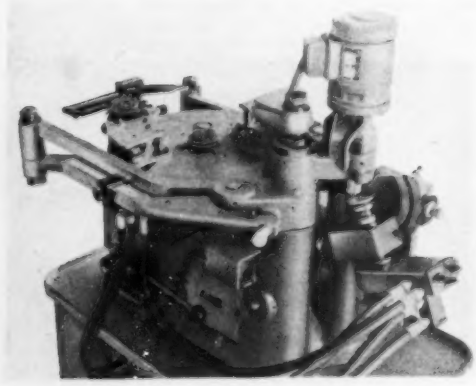
Gaston E. Marbaix Ltd.

Stand 111, *National Hall, Ground Floor*
Stand 306, *Grand Hall, Gallery*

A DANLY press, built by Harland and Wolff Ltd., will be on this stand. The press will be of the 300-ton single-action two-point suspension type, with eccentric gear overdrive. The bed area of the machine exhibited, which is from the wide range available, is 60 in. by 48 in., the stroke being 12 in. and the operating speed 16 strokes per min.

Two DENISON presses will be shown. The first, a 2-ton capacity hydraulic machine (Series A) is a low-priced economy unit which offers up to 10 in. of daylight and a pressing range of from 1,000 to 4,000 lb. Simple electric circuit arrangements involving a solenoid valve allow the press to be operated by timers on remote control. Accessories available include equipment for foil marking, dial feed, bolster, positive stop, etc. The press on show will be fitted with a dial feed mechanism, and strokes at 40 per min.

Fig. 32.—Work head of Billeter automatic engraving machine



The second Denison "Multipress" to be shown is the Model So65L (Series S) with a rating of 6 tons. This will be fitted with a six-station index table and operates at 75 strokes per min. The range of presses available covers capacities of from 1 to 75 tons.

A four-column platen design is also available in capacities from 4 to 150 tons.

Another exhibit among the 40 on the stands will be the STUTZMANN oscillating shaving press, Model SM3. In operation this machine cuts off a chip of about 0.002 in. from stamped pieces. The piece to be shaved enters the die under slow pressure accompanied by vibrations. In this way tearing of the material is prevented and the cut surfaces are smooth and the edges sharp. The effective working stroke of this machine is 0.138 in. and the slide oscillates at 7.3 vibrations per sec.

A BILLETER automatic continuous number engraving machine (Model No. 14) will also be featured (Fig. 32). The mechanism is designed to give quick zero action, composition of any numbers, or engraving of unchanged numbers (*e.g.*, a patent number). One operator can control up to four of these machines at any one time.

DUMORE automatic drill heads are available from the company and these will be exhibited. These heads are completely self-contained with built-in controls, and are air operated. Drilling depth and pressure can be pre-set, and the air supply for operation is produced in the head itself; each head only needs connecting to electric power for operation. The compact nature of these heads, $14\frac{1}{2}$ in. long by $4\frac{1}{2}$ in. dia., makes them suitable for use in a wide variety of multiple drilling set-ups.

A range of DELTA MILWAUKEE air-powered hydraulic drill units will also be on show, together with an ELOX electrical discharge machine for use in 3-dimensional electronic machining.

B. and S. Massey Ltd.

Stand 26, *Grand Hall, Ground Floor*

This company manufacture a wide range of forging and drop forging plant, and are showing six machines at the exhibition, which are representative of their present manufactures. Due to the space and weight restrictions, it will be impossible to exhibit every type of machine manufactured, but those on display will no doubt attract the attention of those members of the forging and drop forging industry who attend the exhibition.

A new addition to the company's range is the

" Wide Ram " presses which are designed for preforming and finishing drop forgings in addition to the usual trimming operations. They are made in sizes from 100-ton to 1,000-ton with table working areas of from 46 in. by 30 in. in the smaller size to a maximum of 84 in. by 50 in. Each press is provided with four one-piece cast steel pitmans, thus ensuring the maximum resistance to tilting of the ram. All bearings are of generous proportions and the clutch is of the direct, air operated friction type. The lubrication unit is automatically interlocked with the main press drive so that when the press is in operation, adequate lubrication is provided for all moving parts.

Alloy steel double helical gears provide the transmission and the frame which comprises bedplate, uprights and crown, is of the box type, welded steel construction for maximum strength ; the whole frame structure being held together by four large-diameter steel bolts which are shrunk into position.

The 10-cwt. " Marathon " drop hammer on show is one of a range from 10 cwt. to 40 cwt. and being electrically driven, the running costs are low. The shock insulated headgear reduces vibration to a minimum, and the Fenner torque-arm speed reducing units now employed have brought down consumption and raised the general machine efficiency. They replace the direct veebelt drive and wooden pulleys previously used. Accurate die alignment is ensured by the exceptionally large areas of contact between the standards and anvil block ; resilient pads are now fitted not only to the horizontal faces, but also to the vertical faces of the spigots.

The recently developed Aeromatic gear which has now, after thorough tests, been adopted as standard, enables the operator to control the hammer by a single pedal which is extremely light in action and provides light or heavy blows of predetermined stroke. Alternatively, when required, the Aeromatic gear can be disconnected and the hammer controlled by hand. The gear may be fitted to new or to many existing hammers of the Marathon and self-contained types.

A high-speed forging press on show, of 1,000-tons capacity, has a substantial frame section, as a result of which the maximum energy goes into the making of the component instead of stretching the frame. The patented friction clutch is mounted on the eccentric, and the parts to be set in motion and stopped at each stroke are of low inertia. Power consumption, heating of the clutch parts and shock to the frame are therefore reduced to the minimum. The clutch is air cooled and protected against overload. The ram and pitman assembly is dynamically counterbalanced, the pressure in the air balance cylinders rising as the ram approaches the bottom dead centre of its stroke.

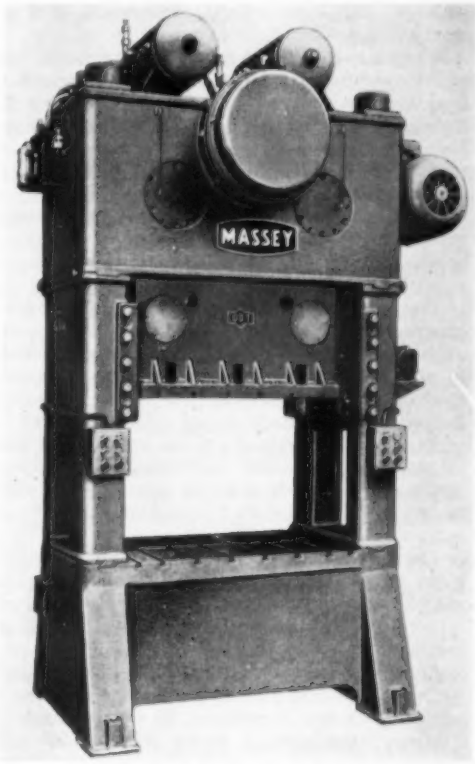


Fig. 33.—Massey trimming press

The eccentric journals are flood lubricated in addition to the dual interlocked lubrication system which makes it impossible for the press to be operated unless the two lubricator motors are running. All movement of the press is governed by the operator working from one central push-button panel and top and bottom ejectors are provided to assist production.

Also on show will be a 7-cwt. " clear space " pneumatic power hammer and a 3-in. " use roller " for preparing work rapidly for forging presses and drop hammers. thus allowing the hammer or press to give a maximum output by concentrating on the finished forging.

The Midland Saw and Tool Co. Ltd.

Stand 106, *National Hall, Ground Floor*

This company will be showing among their exhibits four completely new machines.

One of these will be a horizontal bandsaw cut-off machine (Fig. 34) which is provided with a well-balanced cutting head, of welded steel construction

without springs or weights, and which is automatically controlled in its action.

A large honed cylinder is carried between the base and the cutting head, the operation of which is controlled by a taper needle valve operated by the leading guide. The guides take the thrust of the blade, and the leading guide is hinged and provided with a mechanism to operate the control valve. This mechanism is the subject of a patent.

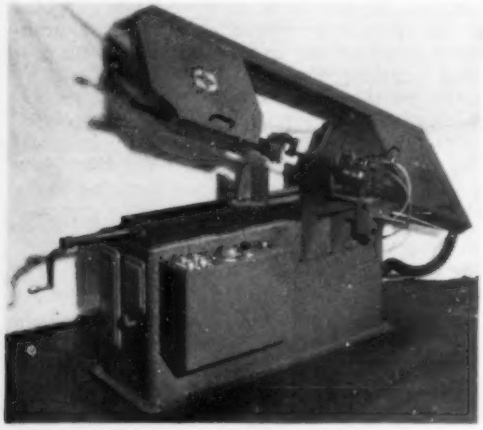
As the pressure increases so the rate of feed is automatically reduced, for if too great a pressure is applied the saw is distorted in its width and wandering will be set up.

The company's "Minor" toolroom bandsaw machine was introduced six years ago, and two of the new machines to be shown are a development of the "Minor" machine. One of these two machines is of similar capacity to the "Minor," but with an increased range of speeds, and so arranged as to take all of the extra equipment normally supplied with more elaborate toolroom machines; the other machine is made with three wheels as a "deep throat" machine with a 36 in. horizontal capacity.

The fourth new machine (Fig. 35) is a development of the company's 30 in. "NF" range of machines; it is now made with a fabricated body on similar lines to the larger 36 in. and 48 in. machines.

Also to be shown are two welding machines, one for bandsaws up to $\frac{3}{8}$ in. wide and one for bandsaws up to 1 in. wide. In addition, the stand will feature "Minor" bandsaws, a 36 in. NF machine with tandem table and an "FP" machine for heavy die blocks and a "Hyspeed" machine. This latter machine will friction cut $\frac{1}{16}$-in. steel at 10,000 ft. per min., and $\frac{1}{8}$ in. plate at 16,000 ft. per min. saw speed. The machine is also suitable for cutting tool and stainless steels, Nimonic alloys, etc., and the manufacturers state that the surface hardening that takes place is only to a depth of 0.004 in.

Fig. 34.—"Midsaw" horizontal band cut-off machine



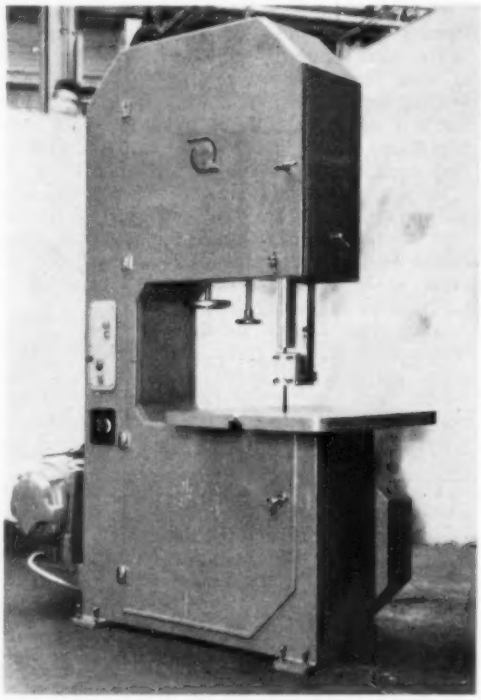


Fig. 35.—"Midsaw" band saw, developed from NF range

Minnesota Mining and Manufacturing Co. Ltd.

Stand 319, *Grand Hall, Gallery*

The company's exhibit will comprise their complete range of flexible coated abrasives demonstrated under working conditions on a variety of modern grinding and polishing machines.

Chief among these will be the "White" 18 in. T.O.P. Model Timesaver Sander for the finishing of sheet steel and strip, alloy sheet and strip and many flat metal components for continuous finishing. Flat surface wooden panels of all types can also be finished on this machine up to the burnishing stage.

The P.G. Wheel will also be in operation, demonstrating its versatility as an automatic multiple head or free hand flexible polishing medium.

Another machine of outstanding interest will be the "Taylor" wet centreless grinder on which Wetordry Tri-M-Ite Cloth abrasive belts will be demonstrated for precision tube finishing and polishing.

Other machines will include the " Grief " conveyor for the continuous semi-automatic grinding and polishing of flat metal components by Three-M-Ite Resinbond Cloth belts; the R.J.H. Backstand general-purpose abrasive belt grinder and polisher utilizing a wide range of contact wheels, and the " Taylor " Deburrer, a variable position backstand machine capable of grinding and finishing metal components of intricate shape.

Of outstanding interest will be the first public appearance at an exhibition in this country of " Scotch-Brite " brand polishing materials. This entirely new nylon web material into which accurately graded fine abrasive mineral grain in incorporated, opens up immense possibilities to improve and speed up the descaling process of strip metals. In addition to the wide application of this product for industrial cleaning, " Scotch-Brite " provides a unique satin-type finish in many materials including stainless steel, alloys, plastic, glass, etc. It is intended to demonstrate the wide application of this entirely new product by means of polishing bobs, cage wheels and in sheet and disc forms.

B. O. Morris Ltd.

Stand 201, *Empire Hall, Ground Floor*

Among the range of machines on show at the company's stand will be the Morrisflex-Hammond series of automatic and semi-automatic polishing machines, built under licence from Hammond Machinery Builders Inc., U.S.A. All the models are built in various combinations for standard units, on the unit principle, which permits accessibility and easy removal of all drives. They are available with mechanical vacuum or magnetic chucks and can be used for grinding, polishing, brushing and deburring.

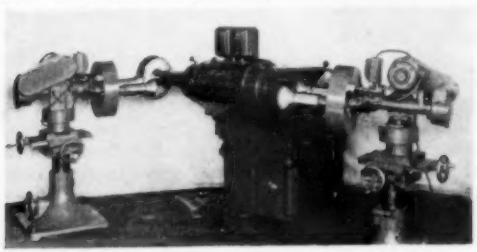
The automatic machines are divided into four main types. The standard indexing rotaries " J " type, the continuous rotaries " C " type and the inline and floating types. The J21 model has a table diameter of 21¾ in. and indexes between 400 and 1,200 per hour and has eight work spindles and three polishing heads. The J34 model is a slightly slower machine indexing between 250 and 800 per hour, with six work spindles and four polishing heads. The continuous rotaries are suitable for high production finishing of a wide variety of parts and are available in spindle, flat top, combination and flat top types with mechanical and plug type chucks.

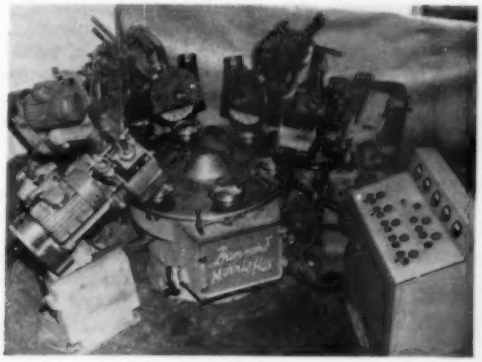
The " inlines " are designed and built from standard units to suit each individual application. There is no reasonable limit to the length of the conveyor unit and consequently to the number of polishing heads which may be installed. Installed units may be easily increased by the simple addition of intermediate sections. They are built for heavy duty and are fitted with wear strips. The variable-speed drive unit, 8-21 ft./min., can be coupled with any conveyor to suit the application. Models on show at the stand include the over and under type with 3-50/99 heads and the horizontal return type with 24-50/99 heads.

The floating type, an example of which is Model 50-99, has a sturdy cast-iron base, with a dovetail slide for the bracket supporting the column, which is manufactured in steel and is provided with a handwheel to give 14 in. vertical movement. A threaded adjusting screw and crank provide a 10-in. horizontal traverse of the column/head assembly. The floating spindle and wheel unit is readily positioned to work on dovetail ways. Further, it can be directly fed into the work on these ways. The adjustment is in addition to the complete head movement. Power raising and lowering and power horizontal traverse are optional extras. The head unit provides 360 deg. movement in both vertical and horizontal planes. The movement in the former is by wormgear and crank wrench, with compensation for wheel wear by ratchet wrench. The base for the motor and spindle can also be turned through 360 deg. in the vertical plane, thus allowing for readjustment of the wheel without changing the previous set angle.

Fig. 36 (*below*).—*Morrisflex-Hammond non-stop, with two E2P machines*

Fig. 37 (*right*).—*Rotary indexing machine with five heads*





The oscillating head and stand units, Models 50-105 and 50-106, have all the features incorporated in the other models plus spindle oscillation in various strokes for use when polishing large flat areas. The heads can be moved horizontally on threaded lead screws, while vertical movement is by handwheel. The spindle and wheel unit is easily pivoted to the setting required and readily positioned to work on dovetail ways.

The semi-automatic polishing machines may be used as simple work-holding devices, as automatic devices or as components of a polishing arrangement. They are planned on the basis of standard units and can be assembled in a variety of different combinations to provide a large number of machines with special applications, each with all the features necessary for any specific application. The assembled machine may be broken back down to its original component units and re-adapted to a new application by the change or addition of standard units. The models include four, two and single spindled models.

Also on show will be the Morrisflex-Hammond polishing lathes. Model MA654 is an independent end polishing lathe with 5 h.p. per end. A single-ended lathe of between 10 and 24 h.p. is available, while another range of abrasive band conversion units is also available.

Another interesting exhibit is the Morrisflex 300 machine, developed to meet the requirements of a simple, multi-speed handy tool which will enable fitters to dress and polish with more ease and speed and improve the finish. Rotary cutters, mounted points and drum sanders can be used to their best advantage by the use of the Morrisflex speed range. Speeds of 3,000, 9,000 and 15,000 r.p.m. are available and the models include a suspension or bench type.

Murex Ltd.

Stand 533, *Empire Hall, First Floor*

The exhibits will include examples of tips, tipped turning tools, milling cutters, drills, both solid and tipped, reamers, jig boring tools, woodworking tools and tools for the plastics industry, beside wire, bar and tube drawing dies and plugs and wear resisting parts, all of which are products of the Murex powder metallurgy division.

A new introduction this year is the Mark II version of the "Prolite" Futurmill having solid hard metal blades, either precision ground or "throwaway" clamped direct into the cutter body. Demonstrations of this cutter will be given daily throughout the exhibition. Other demonstrations will be given showing the use of "Prolite" hard metal burs, solid carbide slitting saws and "Prolite" turning tools.

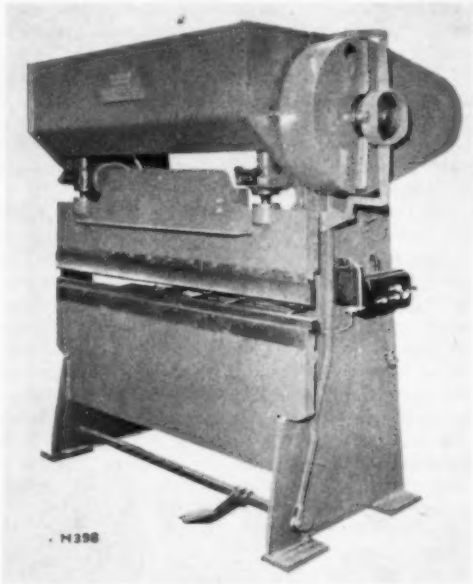


Fig. 38.—Oliver press brake No. 56

Oliver Machinery Co. Ltd.

Stand 25, *Grand Hall, Ground Floor*

Three press brakes will be shown, compact, low-cost and specially designed for quick operation on light-gauge sheet-metal work. Two are new machines Nos. 56 and 265; No. 131 (capacity 10 tons, 4 ft. by 18 g., variable-speed drive) has been shown previously.

The No. 56, capacity 30 tons, 6 ft. by 14 gauge or 4 ft. by 12 gauge, is of all-steel construction, with bed and ram of rolled steel plate (Fig. 38). Ram liners are non-metallic, tough and resilient for minimum wear. The clutch is of the disc type with a hand brake to stop the ram when the clutch is released; the clutch can be inched at any point. Power adjustment is provided for raising and lowering the ram, which has independent adjustment at either end by means of a split coupling on the worm drive shaft. Micrometer indicators facilitate exact adjustment of ram for original and repeat die settings. The drive is single speed, 34 strokes per min.

The No. 265 machine, capacity 25 tons, 6 ft. by 16 gauge or 5 ft. by 14 gauge, has a variable-speed drive, 20 to 50 strokes per min. Disc-type friction clutch and brake, one-shot lubrication system, transmission from drive shaft to ram through two eccentric gears which rotate in opposite directions, eliminating all side thrust on the gibs, are features.

The No. 186, 8 ft. by $\frac{1}{4}$ in. CHICAGO bending brake (Fig. 39) is designed for bending plates to

various angles with sharp corners and making round bends on work that cannot be handled in forming rolls, or for forming tapered cones. Of all-steel construction, it has adjustments to take up wear or strain. The plate is set flat on the bed and clamped, and setting-up time for varied work is said to be much less than with a heavy press brake.

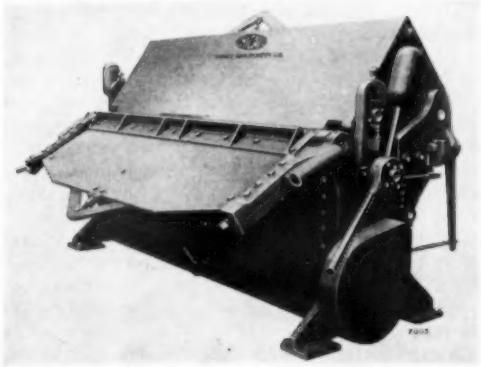
A new hydraulic flanging machine (No. 3 B.V.) (Fig. 40) to be shown forms the flange on flat or shallow dished ends for storage tanks. This is a smaller design of similar machine shown previously and handles plate up to $\frac{1}{4}$ in. thick. The lower roll is mounted in a segment plate and moves in an arc to form the flange round the upper roll. This movement is powered through a hydraulic cylinder fed by a pump driven from the main spindle. The flanging is done cold, ensuring uniformity of ends from one setting of the rolls. Flanging time for a 4 ft. dia. end, $\frac{1}{4}$ in. thick is approximately $1\frac{1}{2}$ min.

Also to be shown is the No. W40, 8-ft. by 14-gauge Chicago box and pan bending brake. Shown previously only for hand-operation, this time the machine will be equipped with mechanical power drive to the bending leaf. The arrangement of geared motor with brake and limit switches has given over 500 up and down movements per hour in production conditions.

A No. 48L Quickwork stamping trimmer will be shown set up with tooling for trimming and forming pressings in one operation, and a No. 321 Quickwork rotary shears, maximum cutting capacity 12-gauge mild steel, will be shown with a new compact circle-cutting attachment mounted in the throat of the machine; for cutting curles up to 24 in. dia. The shears makes a clean cut in one pass through the cutters at speeds of 6, 9, 13, 18 ft. per min. Attachments are available for the flanging, joggling and straight slitting.

Another new machine is the No. 11 Cleatformer, which makes cleats for joining sections of ventilating trunking, as an alternative to riveting, so simplifying erection at site. It is a seven-station rolling machine with extended shafts carrying two sets of rolls at either end.

Fig. 39.—Chicago bending brake No. 186



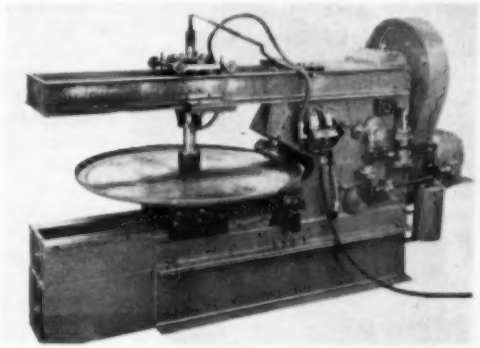


Fig. 40.—Hydraulic flanging machine No. 3 B.V.

Two Lockformers, No. 16 and 20, will be shown, together with examples of work made up with their locks in mild galvanized, stainless and Stelvetite steel. The No. 20 Model will have an auto guide power-flanging attachment which automatically turns up an even flange, following any straight or curved edge.

Other machines on the stand will include a No. 22 power flanger for sheet up to 16 gauge, which makes flanges from $\frac{3}{16}$ in. to $\frac{3}{8}$ in. deep, a No. BB4 Chicago box and pan bending brake, 3 ft. by 16 gauge, a bench-type machine mounted on a stand which handles a great variety of folding work and takes up little space, and a No. 25 shears with a maximum capacity of $\frac{1}{4}$ in. mild steel.

Pearson Panke Ltd.

Stand 12, *Grand Hall, Ground Floor*

Presses and other machines of SCHULER manufacture and ERICHSEN testing machines will be on show on this stand.

The Schuler-SMG double and treble-acting hydraulic drawing press is the first from its range to be exhibited in this country and incorporates a number of unusual features.

The machine (Fig. 41) is fitted with an axial piston pump with constant power device so that the pump can be made to give a high rate of flow at low pressure, or a lower rate of flow at high pressure. Increase in pressure is obtained by swinging the axial piston cylinder block towards the neutral line. Flow in the opposite direction for the upward stroke is obtained by swinging the pump cylinder block past the neutral line to the other side. Thus reversing is obtained without the use of a valve in the high-pressure system.

The press frame is of welded construction, planned so that presses of different sizes can be built from standard hydraulic parts, and with an

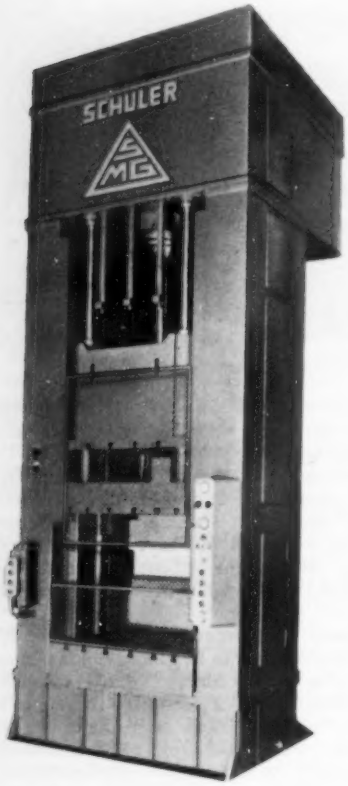


Fig. 41 (left).—S.M.G. press

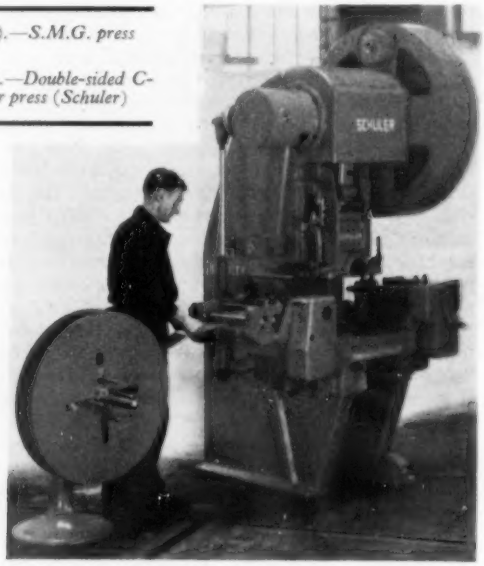


Fig. 42 (right).—Double-sided C-frame power press (Schuler)

almost ideal stress distribution. The main load carrying plates are in the position where the maximum load occurs. The design also enables all the electric and hydraulic gear to be housed in the right- and left-hand uprights respectively.

The upper sheet holder ram moves below the main ram so that any tilt in the sheet holder, due to variations in the flow of the material during drawing or due to variations in the sheet thickness, is not transmitted to the drawing ram.

On the standard machine, the sheet holder pressure is generated through the use of four differential pistons by the main ram in such a way that only 20 per cent of the sheet holder pressure has to be subtracted from the main ram pressure. This arrangement is extremely satisfactory and eliminates the need for a separate pump for the sheet holder. The pressure in each of the four cylinders is controlled independently, which is a particularly useful feature when drawing irregularly shaped components.

By operating changeover valves, the sheet holder cylinders can also be connected to the main pressure circuit, and it is thus possible to operate the press as a single-, double-, and treble-action machine.

The machine to be exhibited, like all the SMG double-sided presses so far installed in the U.K., is fitted with an E.S. photo-electric guard which incorporates a scanning beam so that the area to be guarded is covered completely without any gaps. A special advantage of the guard is that it does not require careful aligning and is extremely robust. In the unlikely event of failure in the guard, it can only be to safety, and in addition to this the guard is fitted with a self-monitoring device by which before every stroke of the press the guard must respond to a test (normally obtained by feeding a component). if it does not respond, it will not be possible to run the press.

The machine will also be fitted with a number of other useful and interesting devices, most of which are part of the standard equipment. Timers are fitted with which pressure can be applied for up to 10 seconds at the bottom of the stroke, and the ram can be made to rest up to 10 seconds at the top of the stroke when continuous running has been selected (on a press with guard it would in any case not come down until the blank has been put into place). Thermostatically controlled oil heating and cooling is provided. A collector pump collects all hydraulic oil (which is also used for lubrication) at the bottom of the press and pumps it back into the system. A scale is fitted to show the position of the ram.

A most useful feature is the provision, in addition

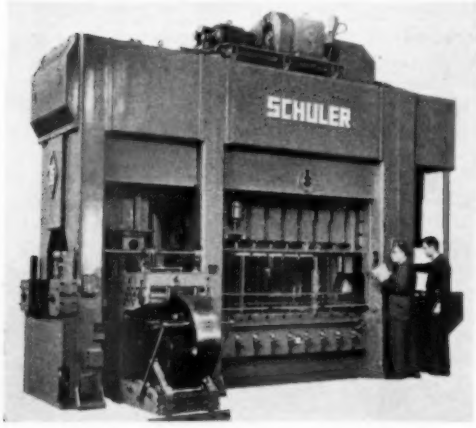
to the electro-servo swinging mechanism for the pressure and speed control of the axial piston pump, of a manual servo swinging mechanism for the pump, with which the ram can be moved with a high degree of sensitivity for setting purposes.

The Schuler double-sided C-frame power press to be shown (Fig. 42) is a 125-tons capacity with reduction gearing. The machine is one of a range which has recently been extended to models varying from 25 to 315 tons in capacity, and which includes inclinable machines, machines with and without reduction gearing and presses with adjustable table.

The main feature of all the machines in the range is the provision of an extremely robust and effective friction plate clutch which offers virtually instantaneous response. With this clutch the press can be brought to rest in any position during the downward stroke, and the cut-out position for the instant stop action during the stroke and also the top stopping position of the crankshaft are adjustable by means of dials. The latter feature enables the press to be stopped in the highest position of stroke, even when use is made of the stroke adjustment and a stroke between the maximum and minimum has been selected. This dial adjustment is linked to a commutator cycle control circuit and the whole system is ideally suited for operation in conjunction with automatic infeed and outfeed equipment, location and ejection check devices, indexing feed mechanisms, etc.

Roll feeds can be supplied for these presses, and special provision is made for these in the standard design as shown by the photograph. The roll feed shown is also fitted with a levelling attachment on the infeed side and a scrap shear on the outfeed side.

Fig. 43.—Schuler transfer press



The Schuler high-speed notching machine, Model MNu 360 to be exhibited is the smallest machine in the range which has recently been extended to five models for stator outside diameters up to 88 in. The speed is variable up to 1,000 strokes per min. and the capacity 2,000 kg. The maximum blank dia. which can be used is 14.2 in.

The machine shown is fitted with automatic saddle adjustment for notching the laminations for conical rotors and stators, and engagement is pneumatic to reduce operator fatigue.

An SMG trimming machine also to be shown may be employed for trimming drawn components of the most varying shapes economically using simple tools and a few attachments which can be employed for a wide range of work. Drawn components of widely varying sizes may not only be trimmed but also formed or provided with a bead. In many cases, these further operations can be combined with the trimming operation.

Depending on the shape and size of the components, it is possible to handle up to 500 components per hour.

The spindles which support the cutters protrude perpendicularly from a horizontal table. A fan-type cover over the opening in the table prevents shavings or dirt from falling through into the machine. One of the spindles is fixed in position while the position of the other can be adjusted by means of a handwheel, and it can further be pushed towards the fixed spindle by means of a pneumatic cylinder which incorporates a pneumatic brake. Both spindles are driven through a single gear which incorporates a hollow-shaft differential so that the peripheral speed of the cutters is synchronized automatically even where the cutter diameters vary.

A brake motor and an infinitely variable V-belt drive enable the spindle speeds to be selected to suit the work in hand, and the spindles can be brought to rest after each operating cycle.

The spindle movement is controlled through an electro-magnetic valve either by means of a two-hand engagement or foot pedal switch. A second electro-magnetic valve connected through a timing switch is provided for the operation of pneumatic clamping devices which may be required.

It is possible to mount the machine frame on rollers and depending on the shape and size of the drawn components, one of a number of methods of working can be selected. For these, one of a variety of special attachments are employed which can be used for a wide range of applications.

Working can be done with a shaped cutter, or a round cutter and round components can also be dealt with.

Other Schuler machines on the stand will be a transfer press (Fig. 43) (Model Pst 160/11/360) an

extrusion press (Model X200) and a thread rolling, trimming and beading machine (Model X200).

Two Erichsen testing machines, Models 129 and 130 will also be on the stand.

The fully-automatic testing machine, Model 130, is supplied in three versions for 12, 20 and 40 tons drawing pressure. In each case the drawing pressure range is sub-divided into three sections so that accurate test results can be obtained from the thinnest to the thickest sheets. The 12-ton model can be employed for the fully-automatic Erichsen Cupping Test to the following standards : Draft ISO/R 209, Euronorm 14-58, DIN 50 101, NF A 03 602 and NF A 03 601 (Persoz). The 20- and 40-ton models can be employed in addition for automatically carrying out the internationally proven deep-drawing cup test (including the Swift test), and also the deep drawing bore expanding test (KWI) as introduced by Siebel and Pomp.

All that is necessary is to insert the sheet-metal specimen and to operate a press button, and then tear off a paper ticket on which the test result is printed. The new testing machine carries out the following operations fully automatically in the shortest possible time : Clamping of specimen under pre-set constant sheet holder pressure—deep drawing at a preselected drawing speed—stopping of drawing punch at specimen failure—registration of depth value by means of counter and printing unit on paper ticket—return to starting position—release of specimen—switching off of complete drive.

The testing machines, Model 130, for 20- and 40-tons maximum drawing pressures, may be equipped with hydraulically-driven blanking press attachment of 40- and 100-tons pressure respectively, to stamp out the circular blanks needed for the deep drawing cup test.

Radio Heaters Ltd.

Stand 72, *Grand Hall, Ground Floor*

A 30-lb. vacuum melting furnace will be a working exhibit and will be shown melting steel in conjunction with a 50 kW. medium-frequency generator working at about 5 kc/s. The vacuum furnace will normally operate at a pressure of about 10^{-3} mm. Hg but the vacuum equipment is capable of giving a vacuum of 10^{-5} mm. Hg. Single or multiple moulds can be provided in the chamber and the crucible is arranged so that pouring can take place whilst under vacuum. Facilities are also incorporated for adding various alloys. Observation windows are also provided.

The Radyne MT.1 vertical shaft hardening unit will be shown working in conjunction with a Radyne type C.240 25 kW. induction heating generator and a 2-station output changeover switch. The unit is designed to surface harden shafts and similar components by traversing them through a single turn inductor and quench ring.

The shaft to be hardened is held between free and driven centres which are mounted on a carriage moving up and down on a Dexter linear ball slide. The carriage motion is provided by a lead screw and a d.c. motor. The speed of this motor and consequently the traverse rate is controlled electronically by a Heenan and Froude Heenatron unit. Cam bars with adjustable cams are provided so that a hardening programme can be set up to suit the particular component. A demonstration will be given of progressive hardening.

A demonstration of Stellite facing for various types of engine valves will be shown working in conjunction with a Radyne type C.240 25-kW. induction heating generator. The process will be automatically programmed by means of process timers and a photoelectric cell working in conjunction with an electronically controlled servo-mechanism. This demonstration is being arranged in conjunction with Deloro-Stellite Ltd. who are arranging the supply of Stellite material, etc.

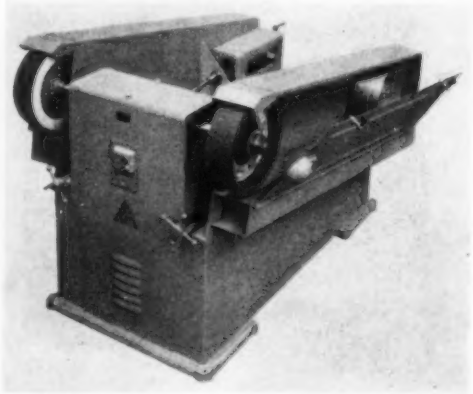
The R.J.H. Tool and Equipment Co. Ltd.

Stand 325, *Grand Hall, Gallery*

A full range of grinding and polishing machines will be exhibited on this stand, and these will include : 10-in., 12-in., and 14-in. double-ended pedestal grinders ; double-ended buffing spindles; carbide tool grinders ; abrasive belt sanders ; backstand idlers ; self-contained backstand machines.

Many of these products are well known but new additions, not shown previously, feature the " Trim Tool " grinder mounted on a pedestal and complete with its own coolant system, with either diamond lap or green grit wheel suitable for carbide-

Fig. 44.—*"Jumbo" self-contained backstand machine*



tipped tool finishing. This unit, which is very moderately priced, is ideal for any small engineering workshop, technical school or maintenance department.

A new design of the " Jumbo " self-contained backstand machine (Fig. 44) will also be shown. This machine will accommodate two 136 in. by 4 in. belts, and will be powered by a 4-h.p. motor at 1,500 r.p.m. or 6-h.p. at 3,000 r.p.m. with vee rope drive to main spindle, A range of speeds can be offered to suit different types of work. The main feature of this new design will be the guards which will be an integral part of the machine body, as also the dust exhaust trunking. Easy and quick belt tension and tracking facilities are provided and it is claimed that most off-hand grinding and polishing operations can be speeded up by using this method. Typical of the wide variety of jobs which can be done on backstand machines are: cutlery, garden tools, fettling castings, cleaning welded joints, polishing bumper bars and other car fittings prior to plating, plastics, rubber and leather products, etc.

Both the above machines will be shown in operation, and visitors are invited to bring their own workpieces along for demonstration.

Rockwell Machine Tool Co. Ltd.
Stands 48 *and* 52, *Grand Hall, Ground Floor*
Stand 508, *Empire Hall, First Floor*

The exhibits of this company will total over 50 in number. The company are agents for British CLEARING presses, and a single-action two-point suspension 300-ton machine will be shown as representing the range. This machine, which has a bed size of 60 in. front to back by 84 in. left to right, will incorporate a Tornadyne clutch and brake unit.

From the range of British-built U.S. Tool Co. design press-room equipment a complete set of coil cradles, stock straighteners, feeds and scrap cutters will be shown. Available from this range are precision slide feeds, operated by the press crankshaft, slide feeds for very long pitches with independent motor drive, cycling feeds, plain and automatic stock reels, stock oilers and wipers, scrap cutters, plain and power-driven stock straighteners, inclined automatic coil cradles, combination automatic coil cradle and stock straighteners, centralizing stock reels and a multi-roll economy coil cradle.

Two British-built " U.S." multi-slide machines are also to be exhibited, *viz.*: the No. 35 and the No. 128. The No. 35 has a maximum length of feed of 13 in. and can take stock up to 3 in. wide and $\frac{3}{32}$ in. thick. The No. 28 machine has a feed (max.) of 8 in. and can form stock of $1\frac{1}{2}$ in. wide and $\frac{1}{16}$ in. thick.

A further interesting machine will be the SACK and KIESSELBACK hydraulic 630-ton cold hobbing press for producing dies. In this process a hardened master punch is forced into a solid workpiece, to produce a die the shape of which is such as to require little or no subsequent machining. The punch while penetrating into the die material, displaces same and at the same time strain-hardens the die material.

The hobbing press to be shown is intermediate in the range available, the lowest capacity machine being rated at 180 tons and the highest 2,500 tons. These presses are built as upmoving types with enclosed cast-steel frames. The pump unit is separate from the machine, and is designed to allow rapid closing of the press; changeover from high to low piston speed is automatic and there is fine adjustment of the low hobbing speeds. These presses are also made as combined hobbing and coining types.

From the range of THIEL machines, five are to be shown, including the 115 precision filing and sawing machine, which can be used for many jobs including press tool making, sheet metal work, etc. These machines can also be used for machining tungsten carbide. Some features included in the design of the machines are: infinitely variable drive, infinitely variable stroke while the machine is running, speed of stroke infinitely variable while the machine is running, table can be inclined through 15 deg. in four directions, magnifying optics, lighting, chip blower, copy-filing attachment, etc.

The British built " BEER " drawing die grinder and polisher will be included in the exhibits.

This machine operates with an endless abrasive band which runs over the driving pulley and is guided through the die aperture by means of the guide rollers on the upper bracket. The two guide rollers are vertically and horizontally adjustable so that the abrasive band will follow any curve or radius in the die aperture. The lower guide roller is mounted on a column below the rotary table and is interchangeable with larger or smaller rollers to suit the die. The column, which is spring-loaded to ensure uniform tension, can be raised after unlocking the clamping lever on the bottom right-hand side of the machine to permit easy replacement of the abrasive belt.

The drawing die is held in an adaptor plate on rotating table which runs on ball bearings and is driven by V-belt. The table bearings are lubricated through the oiler provided. The large pulley carrying the abrasive band is driven directly by the motor, which also imparts the rotating table drive through a worm and wormwheel in the back of the machine. It is advisable to drain and refill the wormgear with new oil periodically (every six months approximately).

Three table speeds are available by removing

the cover on the back of the machine and changing over the V-belt on the stepped pulley. The high speed of the abrasive band, and the slow rotation of the table ensure grinding and high polishing quality in the direction of the draw in the shortest possible time.

The workpiece is satisfactorily illuminated by the built-in table light which is operated by the main switch on the right-hand side of the machine. The table rotation and abrasive band drive are switched on and off by means of the push button switches.

The machine is designed to polish and lap not only round dies but also square, hexagonal, octagonal, oval and rectangular apertures. In the case of rectangular apertures with ratio of length to width greater than 3 to 1, it is necessary to disengage the table drive by removing the V-belt. The die is then guided by hand against the abrasive band just as filing is done on a filing machine.

Shell-Mex and B.P. Ltd.

Stand 615, *Empire Hall, Second Floor*

A demonstration of the stability tests to which Shell soluble cutting oils are subjected will be a feature of the company's stand.

Although tests of this kind have been the established practice for soluble oils in the company's laboratories for many years, two test rigs will be on show on the stand for the first time. One will show the stability of a good quality emulsion. The other will show, by comparison, the effect of a soluble oil having a lower emulsion stability.

The tests will be related to the Shell Dromus soluble cutting oils, an improved range of cutting oils which the company placed on the market in 1959. These new grades contain an improved coupling agent to facilitate the formation of a stable emulsion when the oil is mixed with hard or soft water. The result is that the oils do not possess now the odour of disinfectant normally associated with soluble cutting oils. They are, for this reason, more acceptable to machine operators, particularly women. Another advantage is that since these oils do not have a conventional phenolic coupling agent there is no irritant in the emulsion which is likely to cause skin troubles.

One of the test rigs will demonstrate other merits of the oils. They do not separate into constituents after standing. Another factor is that when added to water of varying hardness they form a stable emulsion quickly and smoothly.

Each of the two test rigs will be subjected to the same degree of pumping and it will be seen that, when agitated, the oils do not foam excessively.

Sciaky Electric Welding Machines

Stand 5, *Grand Hall, Ground Floor*

Sciaky Electric Welding Machines Ltd., announce a new-type four-channel spot-welder control, of the fully synchronous, digital type. The control is claimed to eliminate transients and, therefore, gives a considerable reduction in power demand. Named "Synchro-spot," the unit is suitable for use with any spot or projection welder.

The claimed advantages to be gained from the use of synchronous controls are numerous, and include the remarkable ability of this control to permit welding at speeds in excess of 750 spots per min. Even at these high speeds each weld time can be guaranteed 100 per cent accurate. The use of such accurate controls eliminates a large percentage of the extra spot welds which are normally added to a component to provide the " safety factor " margin which is required when operating with non-synchronous controls.

Duty cycle is improved, electrode tip life is considerably extended and indentation, burning and marking of the material is greatly reduced. Manufacturing specifications can, therefore, in many cases be improved and considerable economies effected.

Phase-shift heat control is a "built-in" feature and this unit eliminates tap changing and enables critical weld settings to be obtained.

The " Synchrospot " is a completely self-contained spot or projection welding control for single weld or auto-continuous operation and is suitable for either static or portable machines or for wall or floor mounting.

The control is composed of a 4-stage dekatron timer, a heat control and an ignitron contactor all housed in a strong, fabricated cabinet, occupying a floor area of only 12 in. by 18 in. The dekatron timer and the heat control are each contained in separate chassis, with all connexions made through plugs and sockets. These chassis are mounted on slides for easy removal.

Controls permit four synchronous time ranges of 1 to 90 cycles each for squeeze, weld, hold, and off and contains the complete machine control circuit including all initiation relays and air valve rectifiers.

All control dials and switches are visible through a perspex window with a separate lock for setter's use while the ignitrons and main connexions are protected by a locked door for the use of maintenance personnel.

By the use of Dekatron timing and stepless heat control this equipment is capable of making very high quality spot welds at speeds of a single weld up to 750 spots per min., while the compact design of the cabinet renders it eminently suitable for service where floor space is at a premium.

Also on this stand will be resistance welding machines including, spot, seam, roll-spot, projection, butt, flash-butt and portable welders from the company's wide range.

Scottish Machine Tool Corporation Ltd.

Stand 117, *National Hall, Ground Floor*

On this stand will be shown a new design of planing machine which incorporates a number of departures from the conventional arrangement. Of these perhaps the most radical has been the adoption of the closed loop type of Ward Leonard drive which gives a greatly improved performance over the conventional open loop system. The most significant features of this drive are:—

(1) Increased horsepower available at the tool for high-speed machining.

The constant torque rating does not cease at half speed but extends right up to maximum speed thus making considerably more power available.

(2) A quicker acceleration to the selected cutting speed and a quicker deceleration at the end of the stroke both contribute to *a shorter cycle time*.

(3) Controlled torque during reversal provides shockless drive to the main transmission.

(4) The selected cutting speed is more accurately maintained irrespective of the load of the cutting tool.

(5) Simplified circuits reduce maintenance.

(6) Wider range of speeds extending up to approximately 50 : 1 ensures that the right speed is available for every job.

Advantage is taken of the wide speed range available by fitting a milling head designed to work with feed rates that are available from the low-speed range of the driving motor. This milling head is of simple but efficient design and by using a small cutter rotating at a very high speed it is able to transmit 20 to 25 h.p. on even the smallest planer and so achieve a rapid rate of metal removal. The compact design of the head allows it to be mounted on the normal tool box slides of the planing machine from which it can be easily removed when planing is to be done by the second tool box.

The steel shaft carrying the rack worm has been increased in diameter and an improved bearing arrangement has been designed. The table moves on flat ways and is guided between the inner lips in order to obtain a long narrow guide for accurate motion while still retaining the broad bearing surfaces necessary for supporting heavy jobs without appreciable wear. The driving worms and the table ways are all lubricated by an independently driven pump. The oil which it circulates passes through filters and a magnetic separator before returning to the tank. The bed ways are completely protected from dirt and cuttings over their entire surface irrespective of the table position.

The uprights are of lattice ribbed construction to provide the maximum stiffness on heavy duty work. The deep crossrail carries at the end remote from the operator the feed motor and feed gear box in which a system of electro-magnetic clutches is employed to enable the operator to select the required working range. Within each range the speeds are infinitely variable.

The tool boxes are of a revised design and incorporate an improved arrangement of the solenoid-operated tool-relieving mechanism.

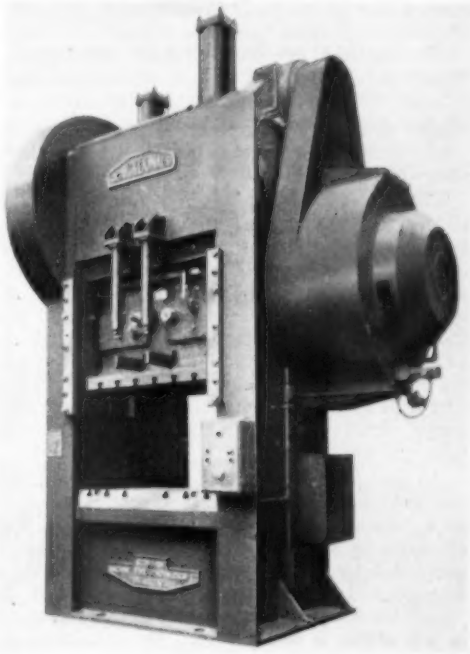
A wide range of controls are available to the operator on the pendant carrying 11 pushbuttons and the special emergency stop (which besides stopping the machine, will also shut down the motor generator set). The other controls for the selection of cutting and return speed, feed rate, etc., are mounted in a panel secured to the side of the upright nearest to the operator.

Also on show will be a CRAIG and DONALD 250-ton two-point mechanical press 45 in. wide having a stroke of 8 in. This machine (Fig. 45) is of standard design and is suitable for either blanking, forming or deep drawing work.

The press frame is of all steel welded construction suitably ribbed to provide stiffness in all directions.

The main drive is transmitted by solid eccentric shaft which is supported on bearings extending right up to the eccentric pins. This gives great

Fig. 45.—*Craig and Donald* 250-*ton mechanical press*



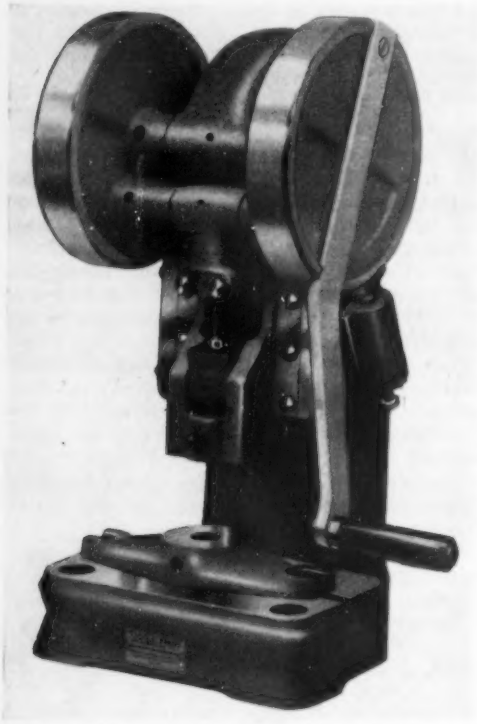


Fig. 46.—Smart and Brown bench type toggle press

rigidity to the shaft, eliminates spring at maximum load, and permits a design of bearing which virtually eliminates lip wear.

The large oversize screws and nuts in the slide ensure that the bearing pressures in the screw threads are kept very low, while the large diameters of these members give a very favourable distribution of the load throughout the slide structure. The slide is pneumatically counter-balanced and the adjustment is motorized. A special feature of the machine is the micrometer dial on the slide for very fine setting of the slide without difficulty. The slide moves between narrow guides in the main frame which is bronze-lined and provided with taper gib adjustment.

An air-operated clutch and brake unit is fitted, the brake being spring-loaded so that in the event of a failure in the air supply the press will stop immediately. The operation of the machine is controlled by pushbuttons and a safety device is incorporated to prevent a second stroke if the "run" button should jam owing to mal treatment. A key switch is also provided for controlling the motorized slide adjustment so that the setting cannot be changed by unauthorized persons.

The machine is provided with power-operated high pressure oil pump, and indicators are fitted in each line so that the individual feed rates can be examined. The connecting rods and slide adjusting mechanism work in separate oil baths.

Smart and Brown (Machine Tools) Ltd.
Stand 305, *Grand Hall, Gallery*

From the wide range of machine tools on show, which will include toolroom lathes, automatic lathes, micro-lathe, grinders, etc., the exhibits of interest to readers of this Journal will be the two bench-type toggle presses. These are the Model H-3, 1-ton capacity, and the Model H-5, 2-tons capacity. The former has a stroke of $1\frac{13}{16}$ in., a daylight of $3\frac{1}{4}$ in. max. and a work-base area of $4\frac{1}{2}$ in. by 8 in. The larger model has a stroke of $2\frac{5}{16}$ in. and a table area of 6 in. by $10\frac{1}{2}$ in. Fig. 46 shows the general design of these machines.

Soag Machine Tools Ltd.
Stand 29, *Grand Hall, Ground Floor*

Of particular interest on the company's stand will be the GILLY roll turning lathe, Model TCAC 30 VC. These machines are available with or without copying equipment. On copying machines, the Heid attachment is used for reproducing work of the highest standard in respect of accuracy and finish. The height of the centres is $14\frac{3}{4}$ in. with a maximum admitted diameter of $21\frac{3}{8}$ in. The distance between the centres is 118 in. and the maximum admitted weight between the centres of 4 tons. There are 16 spindle speeds ranging between 1.2 to 36 r.p.m. driven by a 35-h.p. main motor, with a 2-h.p. feed motor.

Another machine on show will be an M. R. and P. multi-slide forming machine for the manufacture of articles made from wire and strip, Model UB3. Only one machine of this range, for wire diameters up to 11 s.w.g. and strip up to 19/32 in., can be shown. Its main feature is the vertical arrangement of the slides, a design which has thoroughly proved itself in practice. The main technical advantages are, direct and positive operation of the bending slides, clear arrangement and simple design of the tools and accurate infeed, high output and little floor space to accommodate it.

Also on view will be the special high-speed, wire straightening and cutting off machine for electrodes, Model RAE6, being shown for the first time in England. It is intended for cutting electrode wire from 0.08 in. to 0.24 in. diameter and from 8 in. to 20 in. in length.

The company are also showing an M.R. and P., Torrington universal spring making machine, Model W11A, also for the first time at an exhibition. High output, low maintenance costs, an ingenious

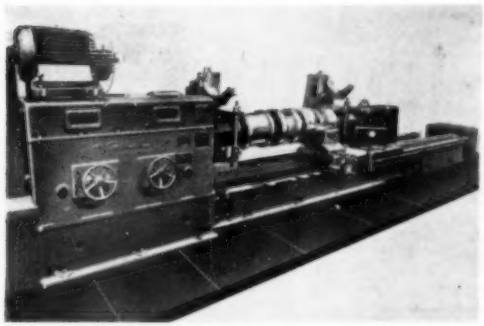


Fig. 47.—Gilly roll turning lathe Model TCAC 30 VC

design and universal application are the main claims for this model. In addition, easy setting, a clearer arrangement of the controls and simplified construction, result in a larger production capacity and an increase in accuracy. Model W-11A is suitable for the automatic production of all types of spring of the compression or extension type, with or without closed ends and with left- or right-hand coils. Cylindrical, single or double taper springs, as well as simple rings can all be produced. By means of an attachment it is also possible to produce torsion springs with straight tails, with open or closed pitch windings and in a variety of shapes. Other attachments increase the working range of the machine and enable universal application.

The wire is drawn from the coil stand by two pairs of feed rollers and pushed into the coiling tool through suitable guides. It is then formed into the required spring and cut off after completion. When producing formed springs the coiling mandrel and the pitch tool are controlled by easily adjustable cams.

The drive is through a stepless, variable gear with handwheel control, to allow adjustment for maximum output on every wire diameter and size of spring. The drive to the feed rollers is through a segment gear driven by crank plate, again providing infinitely variable adjustment of the wire length, which is easily effected on the cam. Machines incorporating this type of feed drive are known as segment machines, as opposed to spring coiling equipment working with a controlled clutch. The segment gear drive of the feed rollers results in a higher output and more accurate wire lengths.

No special coiling plates or accessories are required for right- and left hand springs and change-over is therefore, simply and quickly accomplished. All adjustments respecting the diameter and the pitch can be made while the machine is running.

To extend the working range of the machine and

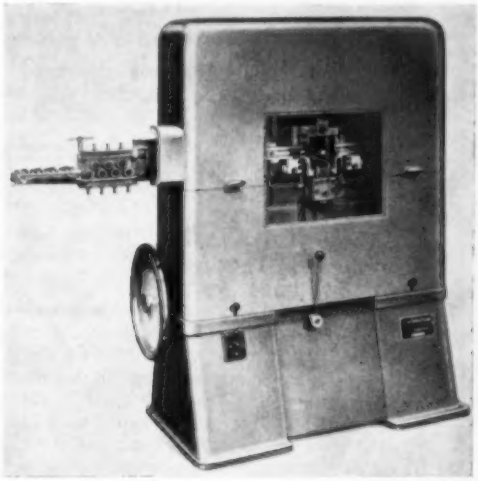


Fig. 48.—M.R. and P. universal multislide forming machine

to increase the accuracy and output on certain springs, a number of attachments have been designed to supplement the standard equipment.

Startrite Machine Tool Co. Ltd.

Stand 430, *National Hall, Gallery*

Startrite Machine Tool Co. Ltd., have now completed U.K. marketing arrangements for the Dutch made METALIN fully-automatic bandsaws. Horizontal bandsawing, as a method of providing blanks from solids, tubes and profiles, has gained rapidly in popularity in the U.K. because of its distinct advantage in cutting times, tool life and material saving over reciprocal sawing methods. Reduced operator fatigue and lower horsepower requirements are further features inherent in horizontal bandsawing.

For medium to long run production of blanks the fully-automatic Metalin bandsaw provides automatic control to all functions.

Once the machine is set-up for a given stock and cut-off length the machine will automatically produce any pre-set number of blanks. Operator attention is limited to removing blanks from the container and loading fresh stock. Apart from the saving of operator effort and time, the production of blanks is considerably faster than with manual control. Cycle time is from 6 secs, to 20 secs. according to stock diameter and blank size.

The Metalin fully-automatic bandsaw operates on an electro-hydraulic system which with its auxiliary relays is housed in a separate console with control panel. The relays and magnetic valves are actuated by micro-switches positioned at limit points on the machine.

Fig. 49 (left).—"Wespa" bandsaw

Fig. 50 (right).—"Sabre" bandsawing, filing and polishing machine

All auxiliary relays, fuses, hydraulic pump, pump motor and reservoir are separately housed in a console with easy access through inspection doors. Flush mounted switches are mounted into the control panel of this unit.

The heavy-duty hydraulic cylinder serves a dual purpose ; under pump pressure it acts as a lifting jack for the main frame and, without pressure, as a check against the gravity feed of the main frame. This hydraulic check is infinitely variable from a remote control through a needle valve and an outstanding feature is an in-built relief valve system operated by overload through pressure on the rear guide housing. If, for a given stock, the feed is too great, pressure from the blade against a spring loaded ball thrust roller, closes the valve to give momentary relief to the feed until balance is achieved. By this system, blade life is increased, more accurate cutting is achieved and optimum cutting time for any given stock is obtained.

The blade guides are of the solid block type, tungsten carbide faced and fully adjustable to ensure an accurate 90 deg. angle to the vice bed. Thrust is taken up through spring-loaded ball bearing rollers. The guides are mounted to solid guide posts, keyed to ensure accurate initial setting and to facilitate blade changing the guide housings and posts pivot away.

The cutting power is supplied from a 1-h.p. three-phase motor, totally enclosed fan cooled type, with interchangeable four step pulleys giving a selection of seven operating speeds 65, 100, 130, 165, 210, 275 and 410 ft. per min. Transmission from the machine pulley to the driven band wheel is through worm and wheel gearing, oil bath lubricated. Band wheels are solid cast pattern, 16 in. diameter mounted on heavy-duty ball bearings. The machine will operate stock up to 12 in. diameter and rectangles 11 by 14 in. The length of off-cuts is variable from zero to 20 in. to an accuracy of 0.010 in. The machine operates with a bandtool 1 in. wide by 143 in. long by 0.35 in. thick and special quality high-speed steel tools are available for working the tougher types of high tensile and stainless steel. Selected cutting oils are supplied to suit these varying applications. A welding unit with grinder, cropper and annealing controls can be provided as extra equipment.

Also being shown are the " Wespa " sliding-table bandsawing, filing, polishing and friction cutting machines (Fig. 49).

Available with 36 by 25 in. throat capacities " WESPA " Bandsaws are of modern closed-pattern construction. The maximum thickness of work accommodated under the tool guides varies from 14 to 20½ in. according to model type. The Bandtool frames are fabricated from heavy-gauge steel plate and two sizes of sliding table 24 by 24 in. and 30 by 38 in. are provided. These precision machined cast iron tables incorporate four " T " slots for the bolting down of workpieces or work-holding fixtures.

The tables are arranged to slide over steel balls in hardened and ground ways. Movement of the table is through hydraulic system and pump or by handwheel and screw according to machine type. The hydraulically-operated table stroke can be regulated to provide pressures varying from zero to 215 lb. per sq. in., according to size and machinability of the work. The table hydraulic feed is adjustable from 0 to 10 ft. per min. through handwheel control, and the feed pressure selected is

indicated on a pressure gauge. Contour sawing to layout lines is easily carried out with the work advanced by hydraulic table power feed. Directional control is achieved through a handwheel which actuates the work holder via guide chains. A circle cutting device can also be used in conjunction with the table power feed and in this case the sawing is automatically effected without layout lines. Tables are mounted on heavy trunnion castings providing two-way or four-way tilt; easy action is ensured by ball mounting of segment pieces. Quick-action positive table locking can be effected in any position—the table sliding action is operative in canted positions. All models include sub-tables for supporting the work to full extent of the machine throat.

The band wheels are cast-iron members, with rubber bonded types. All band wheels are mounted on sealed for life ball bearings. Machines with stepless speed ranges of 40 to 10,000 ft. per min. are equipped with light metal disc pattern band wheels. The upper wheel is slide mounted on precision machined ways with compensator spring for blade tensioning. Blade tracking is effected by handwheel and screw.

Machine transmission is through totally enclosed two-speed gear box incorporating oil immersed hardened and ground gears. Transmission also includes a 10 : 1 variable speed drive with spring expanding and mechanically adjustable pulleys. A wide heavy duty V-belt is used for transmitting maximum power. Handwheel for speed adjustment and gear change are grouped together for easy manipulation. Two steplessly variable speed ranges of 50 to 5,000 ft. per min. and 40 to 10,000 ft. per min. are available with tachometer reading.

Guides are of precision " V " pattern using hardened inserts for lateral blade control and ball mounted rollers to take blade thrust. The tool posts are designed for easy fitment of friction-cutting roller guides, band file holders, 45 deg. and 90 deg. angled cut-off guides, polishing band supports and spiral blade guides.

Standard guide take blades $\frac{1}{8}$ to $\frac{1}{2}$ in. wide and special guide pieces are available to accommodate blades up to 1 in. wide. Mounted in precision ground slide blocks the tool posts are adjusted by handwheel and screw. The upper tool post is hydraulically moved and locked on models fitted with hydraulic feed tables.

All models incorporate in-built flash welding units with annealing controls, band thickness gauge and motorised grinder. An air applicator is mounted on the upper tool guide which can also be utilized for coolant application on machines equipped with coolant pump, tank and accessories. Models without coolant equipment can be fitted with a drip applicator or oil mist applicator including a small motor and compressor. The job selector indicates correct tool, feed and speed for sawing, filing and polishing 48 different industrial materials.

All machine controls are grouped for easy operation and large hinged doors facilitate lubrication and maintenance. An adjustable table lamp and magnifying glass are provided. A special table support is available when operating extra heavy work and hydraulic brakes are applied to the band wheels by foot pedal.

The machines are fitted with motor units varying from 2 to 7.5 h.p. with isolator and overload protection starting gear.

Another interesting exhibit on this stand is the " Sabre " bandsawing, filing and polishing machine Fig. 50, the latest addition to the "Startrite" range. In contrast to the cast construction of other models the " Sabre " is of welded steel construction. Fabricated from $\frac{1}{4}$ in. to $\frac{3}{8}$ in. steel plate the main saw frame is an exceptionally robust unit designed to provide optimum support during all types of bandsawing applications.

With a throat depth of 20 in. it has a maximum distance of 8 in. between the surface of the table and the adjustable upper blade guides. The 23 by 23 in. cast iron table is accurately machined and a " T " slot is provided in the front face for mounting various arrachments including a rack and pinion work feed device. The robust table mounting unit allows tilt in four ways—45 deg. right, 10 deg. left, 5 deg. front, 5 deg. rear. A large aperture is provided allowing easy access to the under table guides, which can be arranged to protrude through the table, a facility which is very useful when awkward sections are being cut. The rack and pinion feed attachment may be fitted with a protractor head, or a work holder which facilitates the cutting of profile shapes. Compared with conventional types of screw feed the rack and pinion movement provides the operator with a more positive and sensitive control of the workpiece during the cutting process.

The vertically-adjustable upper and lower guides provided as standard equipment are the subject of a patent application. Each unit can be readily set merely by turning a knob, to suit blades of various widths. For example, when a saw blade narrower than that previously employed is fitted, rotation of the knob in one direction causes the guide pieces which engage with the sides of the blade to be retracted so that they just clear the teeth, and a back-up roller is moved in the opposite direction to make contact with the back of the blade at the same time. Two sets of guide inserts are fitted on either side of the ball bearing thrust roller to provide maximum lateral control of the band tool. Heavy duty guides can be supplied, also guides which twist the saw blade as it passes through the cutting area, so that when bar is being cut, the

throat offers no restriction to the length that can be handled.

Other guides enable band-type files of flat or half-round section to be employed. The machine tool post is designed for rapid interchange of guide units for sawing, filing and abrasive band polishing. The upper tool post is counter balanced and adjusted to the work surface by handwheel through rack and pinion mechanism.

The saw blades have a maximum length of 130 in. and vary in width from $\frac{1}{8}$ to $\frac{3}{4}$ in. The three ball-bearing mounted bandrolls are 14 in. in diameter by $1\frac{1}{4}$ in. wide and are fitted with rubber bonded tyres. These wheels are interchangeable, and a spare unit will avoid the machine being out of action should a disc become unserviceable. Drive from the motor is by " V " belt and stepped pulleys and then through a totally enclosed two-speed gear box. This arrangement provides 10 saw speeds, which range from 65 to 3,700, or 47 to 2,700 ft. per min., depending on the motor speed.

Saw blade tensioning is carried out by means of a conveniently placed handwheel, and a dial gauge is provided to indicate the correct load for varying widths of blades. A butt-welding attachment with fully automatic settings and annealing controls is mounted in the main frame. Grinding and blade cropping units are also provided. This equipment enables blades to be made up from coil as required. It also allows interior cuts to be made in such things as die sets. The blade can be broken and threaded through a starting hole and then rejoined by means of the conveniently placed welder.

Charles Taylor (Birmingham) Ltd.

Stand 119, *National Hall, Ground Floor*

Well known as manufacturers of spinning lathes this company will be showing an entirely new machine, a 36-in. mechanical spinning lathe (Fig. 51). This lathe has been specially designed to withstand the heavy stress to which it is subjected in modern spinning operations. All castings are constructed to give the necessary rigidity to the lathe.

The drive is from a $7\frac{1}{2}$-h.p. motor mounted in a cabinet at the rear of the lathe. It is taken to a Churchill-Sturm hydraulic motor and thence to the headstock spindle by means of vee ropes. Infinitely variable spindle speeds from 0-900 r.p.m. are thus possible. The operating lever controlling the speeds is placed at the front of the headstock and is easily accessible for the operator. The drive permits simple starting and stopping of the spindle without stopping the main motor, and eliminates the necessity of an electro-magnet or mechanical brake.

The spindle runs in taper roller bearings of the heavy duty type and is flanged to facilitate the mounting of the spinning chuck. An adaptor can be provided to accommodate screwed spinning chucks if required. The drive from the hydraulic motor can be direct to the spindle for high speeds or through gears and friction clutch giving high torque for the low speeds. An oil pump is coupled to the drive and ensures automatic lubrication of all bearings in the headstock.

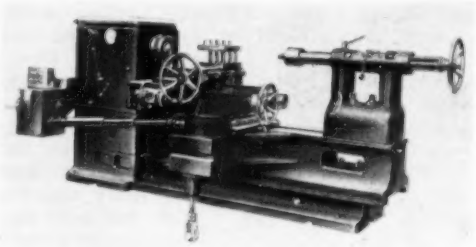


Fig. 51.—Taylor 36-in. spinning lathe

A tachometer is placed on the front of the headstock indicating the r.p.m. of the spindle.

The back centre is a combined wheel and lever operated type permitting rapid advance to the spinning blank. Slots are provided in the casting in any of which the lever can be engaged allowing the handwheel and screw to come into operation and apply the final pressure to grip the blank. The barrel is very robust and is fitted with a revolving holder which will accommodate a centre or spinning plate. The revolving holder is provided with heavy duty roller and ball bearings to withstand the axial and thrust loads involved. A ratchet with lever, operating a rack and pinion, permits easy moving of the back centre up and down the sliding bed when required, thus saving physical energy.

The compound rest is mounted on a sturdy base and is designed to give rotary adjustment allowing the revolving side to be set in any position relative to the workpiece. The compound rest has a mechanical feed drive from a gearbox at the left-hand end of the lathe, through a telescopic shaft to a gearbox on the revolving slide. Ten rates of feed to the tool slide are available. A rapid return of the tool slide is incorporated.

The compound rest can be operated by hand if necessary.

A ratchet with lever, operating a rack and pinion, permits easy moving of the compound rest in and out when setting, thus saving time and physical energy. An emergency stop button is placed conveniently near the operating lever which will instantly stop the spindle and feed.

The sliding bed is provided with mechanical adjustment through a separate motor, lead screw and nut. This has a double feature in that it can increase the width of the gap and accommodate a blank 6 ft. in dia. Also, it permits easy withdrawal

of the compound rest and back centre when it is necessary to move back into a new working position.

A supporting roller which is adjustable for height is fitted at the extreme front of the extension to support the compound rest. This is an advantage particularly when engaged on spinning heavy gauge materials. It can be mounted on a suitable rail so that it can support the compound rest in any position.

The electrical panel is totally enclosed in the cabinet at the rear of the lathe and is easily accessible. Some further details of this machine are :—

Centre height above sliding bed, 22½ in. ; depth of gap, 13½ in. ; maximum width of gap, 33½ in. ; maximum distance from spindle face to back centre, 56 in. ; maximum travel of sliding bed, 25½ in. ; maximum longitudinal traverse of tool slide, 23½ in. ; maximum transverse traverse of tool slide, 10 in. ; maximum sliding movement of back centre barrel, 19 in. ; maximum swing above sliding bed, 45 in. ; maximum swing above main bed, 72 in. ; rates of feed of tool slide per revolution of spindle, 0.0075 in. to 0.18 in. (10 feeds).

Other machines from the company's range will also be on show.

Vaughan Associates Ltd.

Stand 64, *Grand Hall*, *Annexe*

An interesting feature of the company's stand is an ESSA Model BHA.30 high-speed up-stroking press (Fig. 52) equipped with an automatic tool changing device. The device is designed to eliminate the expensive skilled labour needed for tool setting, the complete change being done in a matter of minutes.

The tools are pushed in or pulled out of the press on two tracks by means of hydraulic jacks. The new or re-ground tools are stored on the track which delivers them to a tilting table adjacent to the fixed table at the rear of the press. On the other side of the table is located the exit track for worn tools. When changing, the tool jack first moves up to the tool to be replaced, which is automatically unclamped, and pulled out of the press.

The jack then moves up and pushes along the new tool located on the table as well as the old tool standing on the table. When this has been done, the old tool slides on to the exit track and the new tool is left standing on the table. The jack then pushes the latter into the press and returns to its rest position. Finally, the tool is centered automatically and locked in place by means of hydraulic clamping dogs.

This automatic device makes it necessary to standardize the height adjustment of the tools, and is undertaken by the toolmaker before the tools are placed on the track.

Two Jung machines will also be on show. Model H.30 is a rotary surface grinder, mainly

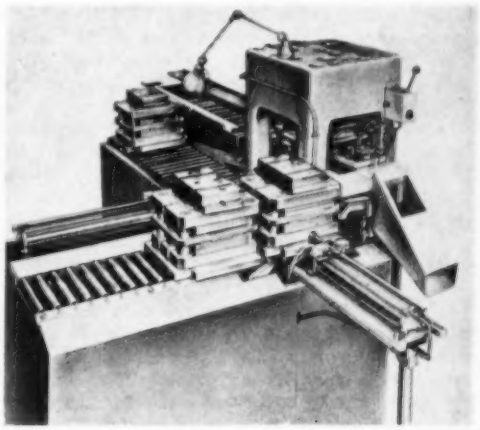


Fig. 52.—ESSA BHA. 30 high-speed up-stroking press

designed for grinding large quantities of small components. It feaures automatic cycling with controllable roughing and finishing rates and has interchangeable pole plates for a 14 in. diameter table. No lubrication is required to the spindle and automatic lubrication for the slideways is another feature. The table is inclinable with column and table slideways of the vee type. The machine incorporates a wheelhead with rapid vertical travel.

The other Jung machine, Model F.50.RD., is a precision surface grinder carrying a wheelhead mounted diaform. This machine is for accurate profile work with the diaform mounted on a specially designed wheelhead, which requires no cooling sleeve since the spindle runs cold and has no growth. Wet and dry grinding equipment can be used, and an optical cross-setting device to direct reading of 0.005 mm. and an infinitely variable spindle speed are special features. The machine also has electro-magnetic chucks and electrically controlled hydraulic circuit for fine grinding.

Another machine on show at the stand will be the Gack precision contour and punch shaping machine, Model K.15. It has a stroke of 6 in., a table cross movement of 6¼ in. and a maximum length of form when shaping curved necks of 4¾ in.

The co-ordinate chuck permits a workpiece to be machined all round its form in one clamping. When used with the optical measuring device, scribing or marking out is not necessary and parts do not generally require subsequent machining on the form. Optical projection equipment, showing the workpiece form magnified on a screen, can be fitted.

The Schubert, Model WM.2, a precision flattening machine will also be on show. This machine

takes a maximum workpiece size of 13.8 by 13.8 in., the material thickness depending on the dimensions and tensile strength of the workpiece up to 0.24 in. It has two roller carrying frames driven by a multi-spindle drive unit. The parts to be flattened pass between the two sets of rollers which are set so that as the material is fed in, it is subjected to reversed bending stresses. As it passes through the gap between the rollers increases so that the part is ejected in the flat condition. The machine can be operated by unskilled labour and can do the work of several skilled men.

Two spark erosion machines, the Agie Models BL.6 and AB.1.5, also find space on this stand. Model BL.6, is a 6 kW. machine capable of stock removals well over 500 cu. mm. per min. It is specially designed for high precision tool making for drop forgers, die casters and press tool manufacturers. Optical table movement and a wide variety of electrode servo-controlled movements allow very universal applications. The table is capable of carrying dies up to 2 tons weight. Pendant controls, rapid motion motors and high capacity dielectric pump lend themselves to fast setting-up and machine tolerances to Schlessinger jig-borer limits enable very high precision work, and surface finishes of 12 micro-inches are obtainable.

Model AB.1.5, is a small toolmaking machine, built in three units for table mounting. Fine control on all spark parameters enables the erosion of holes down to 0.004 in. The maximum erosion rate is well over 110 cub. mm. per min. and it has many accessories, including centering microscope electrode guide, collet holders and vacuum pumping. The inclinable workhead enables angled bores to be eroded.

Edgar Vaughan and Co. Ltd.

Stand 604, *Empire Hall, Second Floor*

Exhibits include a very interesting range of quenching media, giving cooling rates varying in speed from one slightly slower than water to one giving half the speed of conventional quenching oil. Other products selected to indicate the efforts of the research and development departments are :—

(*a*) A light-coloured neat cutting oil which has given high efficiency when used for machining operations on the most difficult materials.

(*b*) A water-soluble grinding fluid—oil free, but giving complete corrosion protection to both ferrous and non-ferrous metals.

(*c*) A dry film drawing compound giving heavy-duty drawing efficiency combined with protection of the stock and components during storage.

(*d*) A range of hydraulic/lubricating oils which give trouble free hydraulic service and complete elimination of " stick slip."

(*e*) Fire-resistant hydraulic fluids which have already compelled attention in all fields and prevented many fires in industry.

(*f*) A rust preventive incorporating water repellency, fingerprint neutralizing and long-term protection, with fluidity and ease of application.

These products can be discussed with a fully qualified technical staff at any time during the Exhibition.

Also operating will be the company's oil service for machine tool exhibitors throughout the Exhibition. To provide for the large quantities of metal cutting oils, lubricants and hydraulic oils required, a temporary oil store with handling and transporting equipment, manned by operatives specially skilled in this kind of work will be installed. For the convenience of exhibitors using the oil service, there will be a separate office on the stand.

Thos W. Ward Ltd.

Stand 55, *Grand Hall, Ground Floor*

Among the various ranges of boring and milling machines, the company will be showing a number of press, shearing and cropping machines, of which the Gosmeta EPS 100 inclinable power press is one. Wards are sole agents in the U.K. for the whole range. In addition to the normal foot pedal control to the rolling key clutch, a reliable electro-magnetic two-hand control is incorporated. This gives a choice of five different methods of operation. The EPS 100 has a maximum pressure of 100 tons, and strokes 45 per min., adjustable $\frac{3}{16}$ in. to $4\frac{3}{8}$ in.

Five machines from the extensive range of " Ficep " billet, bar and plate shearing machines are also on show, for which the company are again sole U.K. distributors. The Model CCL 600 super alligator shear is a hand-operated machine with mild steel capacities of 2 in. (round), $1\frac{3}{4}$ in. (square), flats up to 6 in. by $\frac{7}{8}$ in. beams 6 in. by 3 in.

A universal, punching, shearing, cropping and notching machine (size 25) has the following capacities (mild steel). It will punch $1\frac{3}{4}$-in. hole in 1-in. plate, shear 8-in. by $1\frac{1}{8}$-in. flats ; crop 7-in. by 7-in. by $\frac{13}{16}$-in. angles at 90 deg., $2\frac{3}{4}$-in. round, $2\frac{3}{8}$-in. square and notch $\frac{3}{8}$-in. plate.

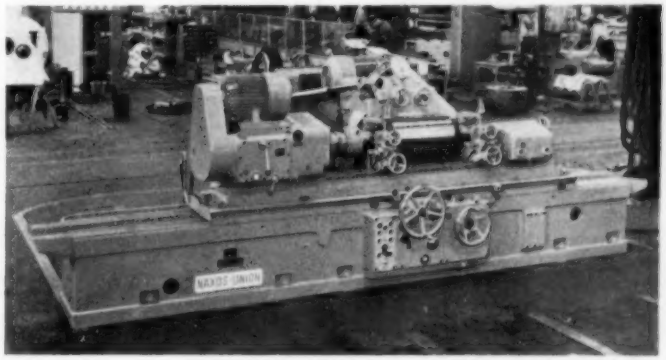
Model CGC billet and bar shears, is hand operated and has a capacity in mild steel cold up to $3\frac{1}{8}$ in. diameter, $2\frac{3}{4}$-in. squares, and $3\frac{1}{8}$-in. rounds. This machine is double geared, incorporating shear pin projection, and carries an adjustable back gauge.

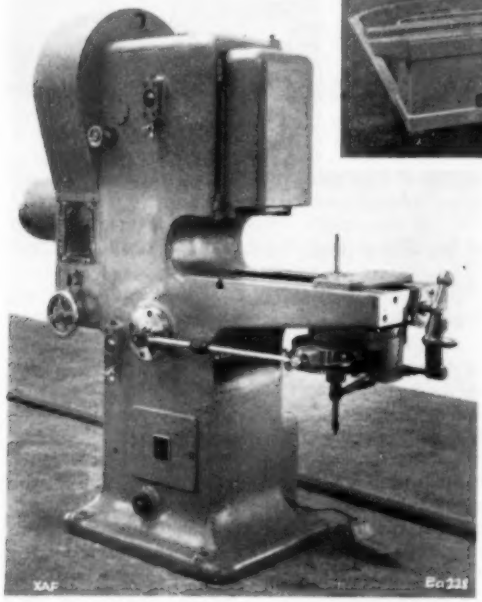
Type No. 3 of the Colt shearing machine incorporates a notching unit that will notch $1\frac{1}{2}$-in. wide in $\frac{5}{8}$-in. M.S. plate, angles and tees up to $2\frac{3}{16}$-in. by $\frac{1}{4}$-in. and 4-in. joists and channels. Capacities (common with types 1 and 2) are : rounds $1\frac{1}{4}$-in., squares $1\frac{1}{8}$-in., $\frac{3}{8}$-in. plate, flats up to 3-in. by $\frac{5}{8}$-in.

Finally, the Beton B.40 bar shears, one of five in the series, has a capacity of $1\frac{1}{4}$-in. rounds, $1\frac{1}{8}$-in. squares, $\frac{3}{8}$-in. plates, flats up to 3 in. by $\frac{5}{8}$ in., and notching $1\frac{1}{4}$-in. by 2-in. in $\frac{5}{8}$-in. plates.

Fig. 53 (below). — Weingarten automatic notching machine

Fig. 54 (right).—Naxos-Union roll grinding machine





Wickman Ltd.

Stand 65, Grand Hall Annexe

Of particular interest, the MAYPRESS cold-forming press, is made for either vertical or horizontal application. The ram does not have a ball and socket connection and thrust point as on conventional crank presses, but is actuated by twin connecting rods in tension, eliminating tilting movement. As the press frame is not subjected to tension loading, it is secure against breakage and provides a rigid housing for the ram guide ways. The stroke adjustment permits the use of three different lengths of stroke and contributes in large measure to achieving the best ram speed for cold flow press work. Pole changing motors are another feature of the equipment and combined with the three lengths of stroke, six different ram or pressing speeds are available. All these presses have a hollow ram which is designed to allow special equipment to be fitted at will. In one particular design the press may be furnished with a shock absorber built into the ram, which takes the initial shock load before the top tool seats against the ram. It can be set for any pressure range so that the pressure build up follows logarithmically from zero to maximum working pressure. This means that cold work commences quite softly, but at the same time the ram travel or depth of penetration is accurately limited. The machines are available with maximum pressures of 160, 300 and 200 tons.

Another machine that will be shown at the stand, is the Naxos-Union roll-grinding machine (Fig. 54). These grinders are produced for all normal sizes of rolls. The smaller types are designed with stationary grinding headstock and traversing work table. On the heavy machines, the work is stationary and the grinding carriage traverses. The camber grinding arrangement underlines the real value of these grinders, in that it is not limited to one given characteristic of camber curve. A convex or concave curve can be obtained for any desired line, for instance, sine-line, parabola-line, bending-line or empirical-line. By changing the cam disc, the characteristic of the curve can be changed. Some interesting design details have been incorporated in these machines. The front bed carries the table with the work headstock and tail-stock. It is firmly bolted to the rear bed on which the grinding headstock is mounted. Both castings are of ample dimensions and are properly strengthened to absorb static and dynamic forces. The work table moves on wide guideways in the bed, protected by belts.

Among the WEINGARTEN machines that the company is showing is the XAF high-speed automatic notching machine (Fig. 53), with infinitely variable drive. The manufacture of components of high accuracy demands the use of a machine virtually free of vibration and providing optimum indexing accuracy. This machine claims to satisfy all the requirements. In addition to an extremely sturdy box-type frame, it has a new and very important feature in the form of a ball-type ram guide, which guides the ram with extreme accuracy as required

when using cemented-carbide tools. All tools used in this machine benefit from the advantages offered by the play-free ball-type ram guide, and experience has shown, within the firm, that this arrangement ensures longer retention of tool sharpness and subsequently longer runs between regrinds. High-grade materials are used for heavily stressed parts, and all rotating and sliding faces are connected to the automatic circulating system of lubrication. They are equipped with a friction-plate, as a conventional clutch would not stand up to the high speed operation. Engagement is effected pneumatically with a movable treadle-type switch requiring only slight movement and pressure for operation.

Another noteworthy exhibit will be the Weingarten percussion screw press, a press that occupies a leading position among machines of this type. It has a press frame amply dimensioned and cast in one piece from special iron for presses up to 240 tons and from steel for the larger sizes. The ram is made from high-quality cast steel, deeply constructed and with long precise guides, which offer maximum protection to tools where there is off-centre loading. The guideways are bronze lined and are adjustable. A special bronze spindle nut is enclosed in a steel sleeve and fixed rigidly to the ram. The screw, probably the most important and highly stressed member is made of chrome nickel steel, and is fixed axially in the flywheel. The single-sided trapeze formed screw thread has a favourable profile against thrust loads, and has full engagement in the screw nut even when the ram is in the bottom position. Two types of drive are available, friction roller drive for machines up to 240 tons pressure and friction roller drive or gear drive for the larger machines. This press has been proved in the course of years of operation on varied types of work. A further advantage which is awakening increasing interest in these machines is the fact that they produce dimensionally accurate parts. The reason is to be found on the one hand, in the rigidity of the machine and on the other hand, in that with the dynamic pressing effect, the spring in the machine has no effect on the component as in the case of crank and toggle presses.

Last, but by no means least, the company will be showing the HERLAN impact-extrusion press (Fig. 55). These presses are of the horizontal type and operate automatically. A cast steel frame and anti-friction bearings running on high-speed shafts are among the favourable design features of it. Each machine has its own motor which can be easily detached and fixed to the floor if necessary. Easily accessible tool holders of simple and solid construction permit accurate centring of tools and rapid interchangeability. Feeding is automatic, and stripping-off the extruded parts is effected mechanically and automatically transported out on a conveyor belt. These presses will produce a great variety of form parts and pressings in large quantities, from collapsible tubes to numerous types and sizes of containers. A number of materials can be handled such as aluminium, lead, tin, and zinc.

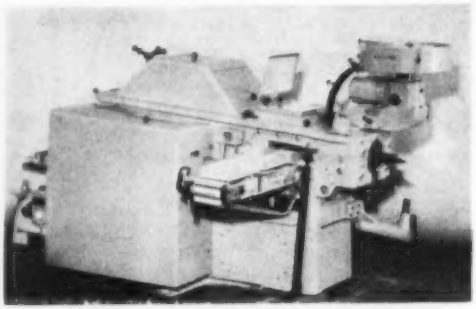


Fig. 55.—Herlan extrusion machine

Wild-Barfield Electric Furnaces Ltd.

Stand 120, *National Hall, Ground Floor*

Equipment to be exhibited will be representative of the resistance furnace, induction heating and vacuum divisions of the company.

The keynote of the furnace exhibit will be the scientific control of an active process atmosphere, and to demonstrate this, two types of sealed quench furnace will be shown operating in conjunction with an endothermic gas generator. Complete control of atmosphere conditions to suit changes in material and/or application is achieved in the larger furnace by full automatic dewpoint control on both the gas generator and the furnace, which will be a full-scale production " ACE " type, complete with full ancillary equipment. Working dimensions of the furnace chamber are 20 in. by 16 in. by 10 in. The smaller furnace will be of the hand-operated slipper type, for the clean hardening, etc., of small components such as parts of small ball bearings. The G.W.B. Endothermic Generator will be operating on bottled liquid petroleum gas—propane. Typical installations of sealed quench and other types of furnace dependent for their efficient operation upon reliable atmosphere control will be illustrated by means of photographic enlargements.

High-frequency induction heating equipment will feature a new Wild-Barfield AHF 2.5 kW. generator, with intermittent rating up to 3 kW., incorporating full range power control. In addition, a standard 25 kW. set will be exhibited in conjunction with a new progressive vertical and rotary hardening machine, designed to have a very wide range of application.

The exhibits will be completed by a Wild-Barfield NRC 12/17 lb. (molten steel) capacity vacuum induction melting furnace.

Wilkins and Mitchell Ltd.

Stand 14, *Grand Hall, Ground Floor*

A double-action straight-sided press with a total rating of 750 tons on the crank will be featured on this stand. The general specification of this press is similar to that of the 1,000-ton machine (drawing slide 600 tons) (Fig. 56) recently described in this Journal.

The frame is of unit construction, consisting of bed, columns and crown, aligned by keys and clamped by tie rods, the units being fabricated from rolled-steel plate, stress relieved and designed to ensure minimum deflections under operating conditions.

The tie rods are carbon-steel forgings, machined to take cartridge-type heating elements ; these are shrunk into place with sufficient preload to ensure that the " lift off point " for the frame is twice the rated capacity of the press.

Both draw and blankholder slides, which are of fabricated rolled-steel construction, are designed for maximum rigidity and minimum deflection, and are exceptionally deep with slideways of long length making for better guidance. All slideways are phosphor-bronze lined and provision is made for accurate setting of the blankholder. In each case the slide adjustment is motorized with an additional feature on the blankholder slide of $\frac{1}{16}$-in. individual hand adjustment at each corner.

Power transmission is effected from the clutch shaft by triple reduction gearing to the pin eccentrics, from which the connecting rods impart the draw-slide motion. A link mechanism from the eccentrics gives the required motion to the blankholder slide.

All high-speed shafts are mounted in anti-friction bearings and low-speed shafts, connecting rods, links, etc. are bronze bushed and individually lubricated. Gears and links are of high-quality steel castings, shafts and pinions of alloy steel, eccentrics and eccentric pinions are straight spur, all other transmission gears being double helical.

The clutch is of the pneumatically-operated, low-inertia insert type, designed for easy maintenance, and the brake is of similar design but spring applied. The removal of the inserts requires a minimum of breakdown time, and a combination of large friction surfaces and adequate ventilation ensures cool running.

The heavy flywheel on anti-friction bearings is quill mounted, thereby eliminating high bending stresses on the shaft and ensuring true running.

The draw and blankholder slides are individually counterbalanced by pneumatic cylinders with ample-capacity surge tanks, the controls of which are mounted in the column and are adjustable from floor level. The size of the balance cylinders ensures adequate allowance for tools.

The centralized, full-flow, circulating pressure lubricating system ensures a measured supply of oil to each bearing and the system is protected by limit switches interlocked in the press control circuit to guard against failure. Slideways are grease-lubricated by a manually operated centralized system.

All electrical gear is built in to the press columns and consists of all motor starters and control gear, including an infinitely adjustable multi-cam rotary limit switch. A setter's panel is mounted at the front of the press and operator's plug-in push button stations are available at each corner. Solenoid-operated auxiliary pneumatic circuits are fitted, together with sequence-timed rotary limit switches, and pneumatic and electric take-off

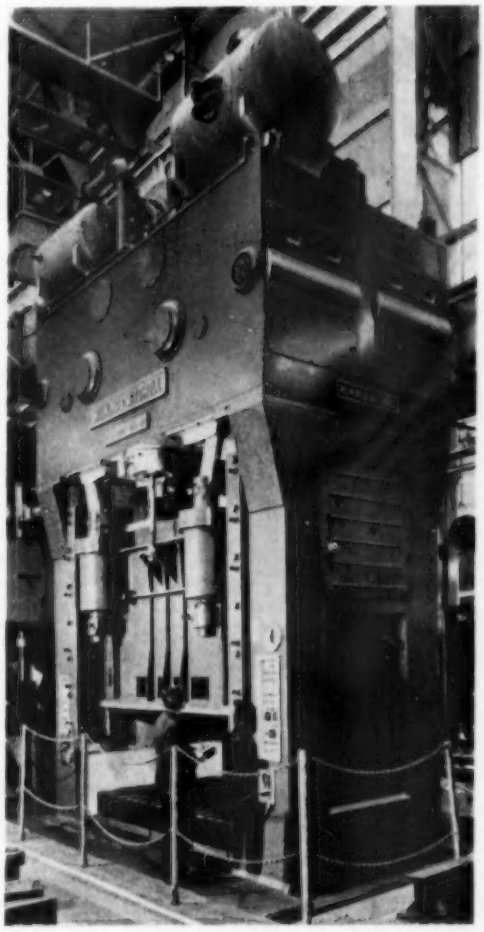


Fig. 56.—*Wilkins and Mitchell* 1,000-*ton D/A press*

(*Continued in page* 446)

Letter to the Editor

● Drawing Cups Using Rubber Pads

SIR,—The article "Drawing Cups from Thin Metal Sheets Using Rubber Pads," which appeared on page 184 of SHEET METAL INDUSTRIES, March 1960, is of particular interest to me.

This is an unusual method of producing drawn articles, and is unlikely to be encountered except by those who are required to produce cups on a one-off or short-run basis.

As one who is in this category, I have recently had occasion to apply deep-drawing principles in this manner, to put a ½-in. flange on a 2-in. diameter diaphragm in 0.005-in. stainless steel.

The results of this exercise were successful, in that a wrinkle-free flange was produced, but from my experience, the application of the principle as shown in the published diagrams, will result in the closed end of pressing being partially reverse drawn. The reason for this is as follows :—

When the pressure on the rubber is being released, a point is reached where the opposing spring pressure exceeds that of the rubber.

This allows the pressure plate to rise and so commence to strip the pressing off its punch, but at the same time the rubber is still exerting sufficient force to hold the pressing down on to the crown of the punch, and being so held, a reverse drawing action takes place.

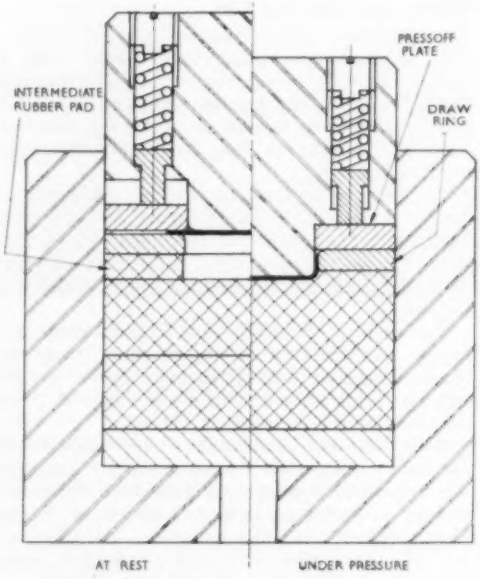
A method of overcoming this would be to render the springs inactive before releasing the pressure on the rubber, but unless the release of the springs can be controlled, the pressing will be shot off the punch when the springs are released.

The answer I found to this problem is to use an intermediate rubber pad, at the centre of which, a hole is made, large enough to allow the pad to pass over the punch, the thickness of the pad should equal the depth of draw.

This pad is inserted between the tool and the main rubber pad.

When pressure on the rubber is released and the stage is reached where the spring force begins to equalize, the area above the crown of the punch will be free of rubber, and the pressing having nothing to restrain it, can rise steadily with the pressure plate.

The diagram (above, right) shows the adapted tooling used in my exercise. I have not shown the convolutions which are put in on a previous operation



and which serve to locate the blank upon the punch; a plain blank could, of course, be located in a register machined in the pressure plate.

Yours, etc.,

R. PERRY
(Tool Maker).

60, Great Plumtree,
Harlow,
Essex.

The Machine Tool Exhibition

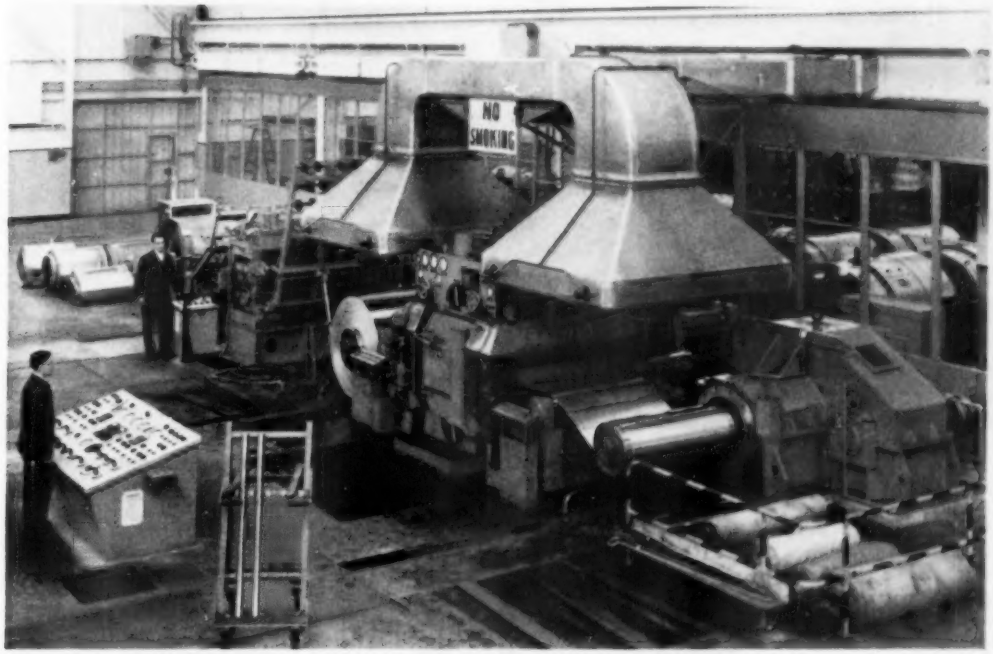
(*Continued from page* 445)

points are incorporated for hand tools, etc.

Two-speed clutch units can be incorporated in the press drive if required, and cushion equipment, overload devices, etc., can be incorporated.

Also on show will be a 500-ton "Forgemaster" S press. This is of all-steel section fabricated frame construction with Wilkins and Mitchell high-duty low-inertia clutch and brake units mounted direct on a forged eccentric shaft—no intermediate gearings. The heavy section steel connecting rod with generous bearing areas is carried within the press slide member. This slide has exceptional length/width ratio and operates in fully adjustable bronze-lined vee gibs. The press is fitted with automatic top and bottom ejectors, with hand-operated wedge adjustment and direct reading scale. It has a high-pressure circulating oil system to each major bearing, and quill mounted flywheel direct on frame.

HIGH-SPEED ROLLING OF ALUMINIUM-ALLOY STRIP



Birmetals Ltd. Install Sendzimir Mill

A SENDZIMIR cold strip mill has been installed at the Woodgate Works, Quinton, of Birmetals Ltd. The mill—the first of its kind in Europe devoted to the rolling of aluminium alloys—has cost one million pounds, and has been housed at the works in a completely new building.

The mill itself is a 50-in. reversing mill capable of rolling aluminium alloys in coil form at speeds up to 1,600 ft. per min. The finished width of the coil obtained is 48 in. and the thicknesses which can be produced range from $\frac{3}{16}$ in. (0.1875 in.) down to as little as 0.006 in. This is a remarkable range for a rolling mill and indicates the complexities which have had to be faced on the electrical and electronic side of the project. Automatic tension control and continuous measurement of gauge are incorporated in the mill.

The $2\frac{5}{8}$-in. dia. work rolls are ground to very high precision to give absolute uniformity across the width of the strip, a feature hitherto unknown in the rolling of aluminium alloys, and a roll-change in the mill can be effected in less than a minute and so makes the mill very flexible in its capabilities.

When the mill is in full operation it will finish-roll between 12,000 and 20,000 tons of sheet per annum according to average final gauge (this tonnage is the equivalent of 35,000/60,000 in steel). To obtain the maximum benefit from the mill it is necessary to feed it with the longest possible coil from earlier operations. It will take a coil up to 10,000 lb. in weight, but the coil being rolled at the present time weighs just over 8,000 lb., which is equivalent to 11 tons in steel.

Fig. 1 (above).—General view of mill. Strip is being rolled from left to right

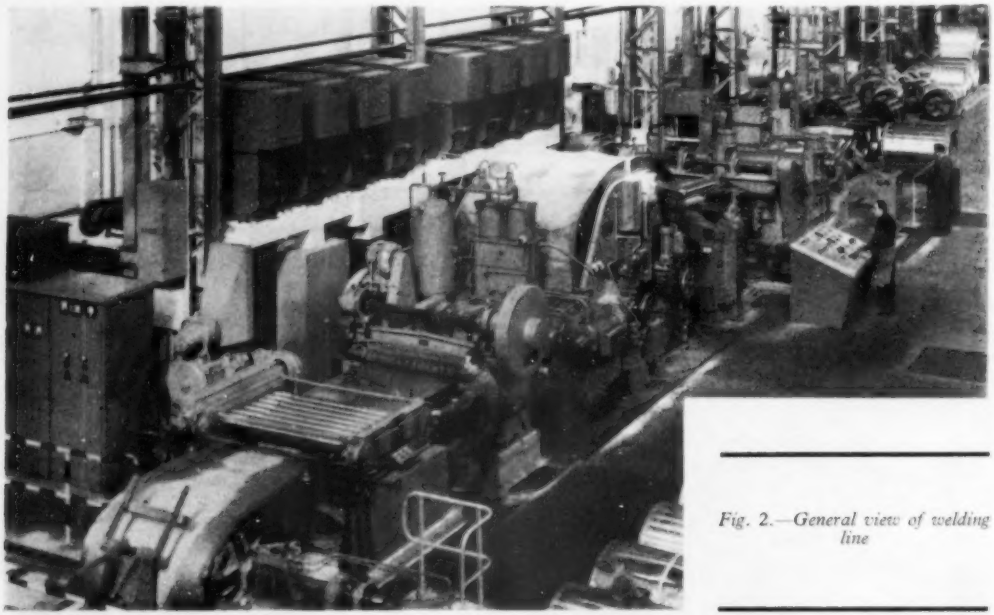


Fig. 2.—General view of welding line

To be able to cast a rolling slab capable of producing a single coil of this weight, and to have a hot mill capable of rolling this super slab, would have meant an estimated capital outlay by the company of another two million pounds, and would have put out of work some of the existing plant. This was not considered an economical proposition, so that the idea of welding together a number of smaller coils with the desired width to form a heavy coil was considered and a scheme formulated for flash-butt welding of strip up to 52 in. wide.

The result is that the welding line, which is composed of a number of ancillary units and the flash-butt welding unit, now forms a complete unit producing the desired heavy coil demanded by the Sendzimir mill.

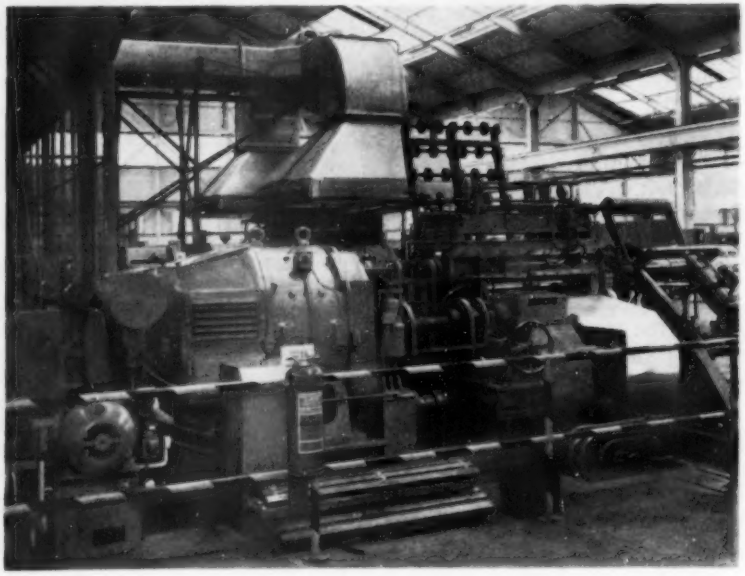


Fig. 3.—Entry section of Sendzimir mill

The electrical load on flashing the butt welder is 290 kVA. and at the instant of forging is 2,320 kVA.

Many other items of equipment, all of which have had to have special attention to technical detail, have been incorporated in the whole scheme. Such items are a coil-annealing furnace, slitting

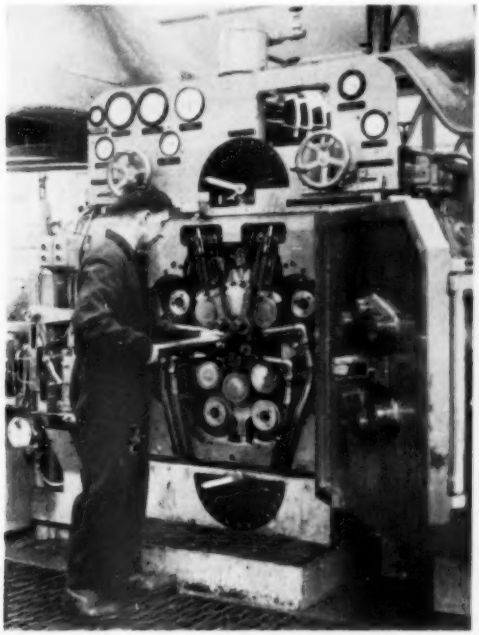


Fig. 4.—Changing a work roll

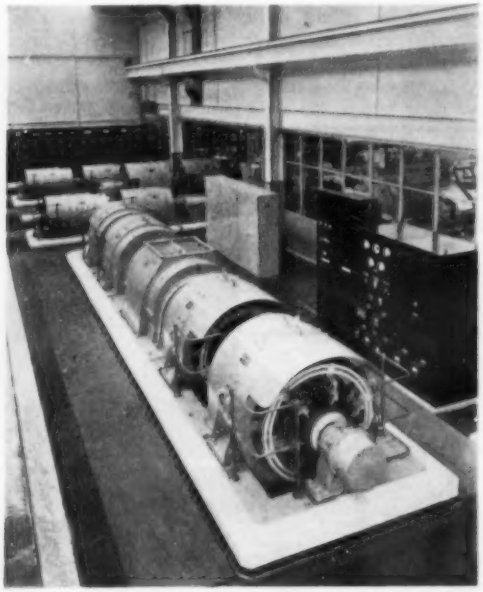


Fig. 5.—Main motor-generator set supplied by A.E.I.

line, cut-to-length line, and sheet-annealing furnace incorporating a flash-annealing furnace 40 ft. long followed by a cooling chamber 42 ft. long. Continuous tapes carry the sheets through the furnace at a speed of up to 100 ft. per min. Because of the unusual length of this furnace, many tests over an extended period of time had to be undertaken to ensure uniformity of annealing in the sheets. This uniformity has now been achieved.

The foundations for the mill, concrete and reinforcements, weighed a total of 2,500 tons and in addition there are miles of piping and cable ducting beneath the floors. The underground work, together with the electric and electronic equipment, accounted for a large proportion of the total expenditure.

Buildings

All the special equipment, with the exception of the welding line, is housed in a new building, covering a floor area of 45,000 sq. ft., and which is situated to receive conveniently 8,000-lb. coils from the welding line, which is located adjacent to an existing 4-high reversing strip mill. The main bays are 200 ft. long and 78 ft. wide, one housing the Sendzimir mill and the other a Hallden-Robertson cut-to-length line and G.W.B. flash annealing furnace. The despatch bay, which is 120 ft. long and 60 ft. wide, is connected to, and

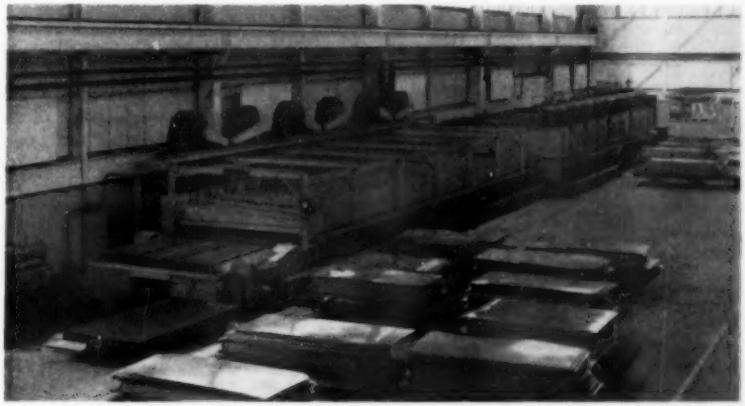


Fig. 6.—Flash-annealing furnace (G.W.B. Electric Furnaces Ltd.)

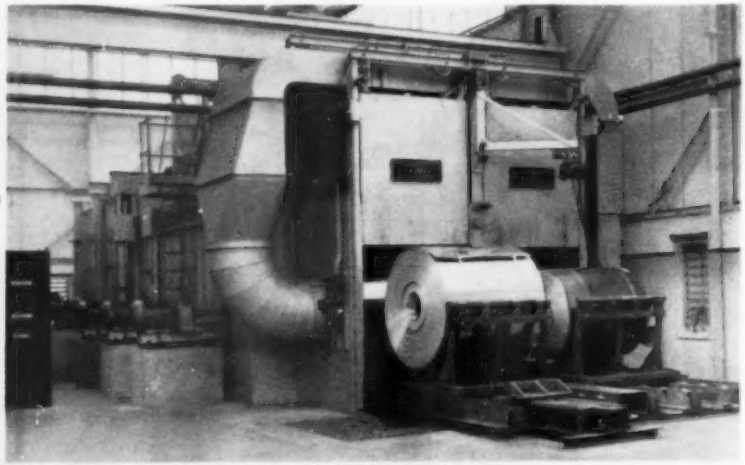


Fig. 7.—Stordy coil-annealing furnace

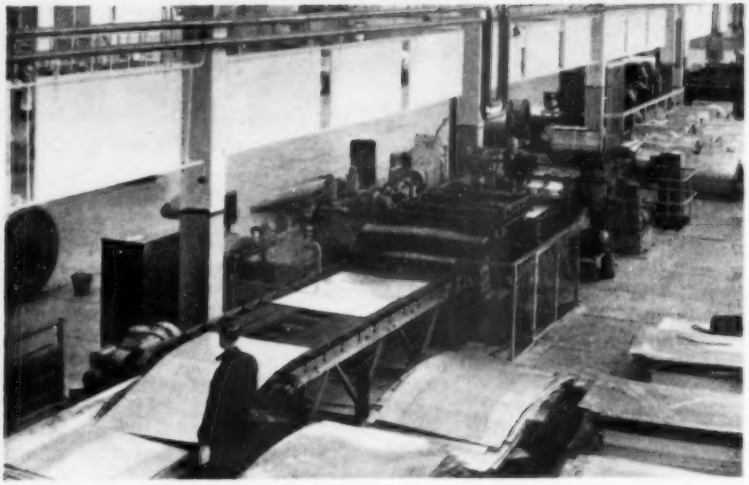


Fig. 8.—Hallden cut-to-length line supplied by W. H. A. Robertson and Co. Ltd.

forms an extension of, the existing inspection and despatch department. Adjoining the mill is a 40-ft. wide bay containing a motor room, also an oil-filtration plant, fitters' shop, sub-station and a Stordy coil-annealing furnace. This furnace is charged from, and discharges into, the mill bay.

The steelwork of the building, constructed and erected by Braithwaite and Co., is of the Portal-frame type, and is clad with trough-section Birmabright aluminium-alloy sheet, down to the perimeter wall which is 7 ft. 6 in. high. Birmabright is also used for the downspouts and sliding doors which, with the cladding, were made by Birmetals Ltd.

Welding Line

This unit takes coils up to 2,000 lb. in weight and up to 52 in. wide from the existing 4-high mill and flash-butt welds them together, providing, when edge trimmed, coils weighing up to 8,500 lb. These coils are approximately 50 to 53 in. dia., with a weight per inch of width of approximately 170 lb.

The welding line comprises a pay-off stand, feeder leveller, shears, flash-butt welding unit, weld dresser, edge trimmer, scrap chopper and coiling unit, all assembled to Birmetals' requirements. Of these units the pay-off stand was supplied by the Bronx Engineering Co. Ltd., and the feeder leveller and shears are both items of Birmetals' existing plant which have been adapted for use in the line.

The welding unit was specially designed to Birmetals' requirements by A.1. Electric Welding Machines Ltd., and the weld dresser, to remove

the up-stand from the butt weld, was supplied by Wadkin Ltd. The edge trimming and scrap chopping units were supplied by Auxiliary Rolling Machinery Ltd., and the pinch rolls and tension reel are by The Wellman Smith Owen Engineering Corporation Ltd.

Direct current is supplied to the main drives by a motor-generator set, which together with the driving motors is of The English Electric Company's manufacture. Capacitors for power-factor correction were supplied by The Static Condenser Co. Ltd., and a suitable step-down transformer was supplied by Gresham Transformers Ltd. The integration and control of all the electrical units in this line were carried out by Birmetals' electrical department.

Generally speaking, flash-butt welding has been applied in the past almost exclusively to ferrous metals, except on a relatively small scale to aluminium-alloy sections. Again, in steel strip mill practice, flash-butt welding has been used for some time and is accepted practice in coil build-up lines. For the flash welding of aluminium strip in widths up to about 50 in. the welding equipment does, however, represent a new and important development.

In approaching the project, the designers were faced with a number of problems, the main ones being the high electrical conductivity factor of the material being welded, thermal considerations in heat zones, high power demands on the electricity mains supply and the almost complete absence of any plastic state or forging zone as is usual in ferrous metal prior to the forging application.

Not only had the weld to have characteristics of high value in comparison with the parent metal, but perfect alignment at the joint with satisfactory weld upset removal to within surface limits, and this has been very effectively achieved.

The original design of welder suggested envisaged two load periods, three seconds for flashing when the load would have been 1,330 amp. at 400 v. and 1/7 sec. to forge the weld, in which period the load would have risen to more than 10,000 amp. (4,000 kVA.), more than eight times the flashing load. This high load would have caused great disturbances to a large area of the supply network, causing flicker on lighting circuits and giving particular effect on the screens of television receivers.

Work on the mill had made good progress when it was found that the Midlands Electricity Board could not accept the proposed welder load and investigations were started, as a result of which the system at present installed was adopted.

The automatic flash-butt welder is of 3,000 kVA. capacity and incorporates many novel features for load reduction on the electricity mains supply lines, apart from the automatic control system incorporated in the machine, giving push-button operation in sequencing the strip through the welder.

The tailing end of the small coil is cropped by guillotine and passed through the welder with the clamps in the raised position. The tailing end is then inched back against the gap gauge of the welder and securely clamped with a pressure of 250 tons.

The leading end of the new coil is, after cropping, inched into the welder dies against the gap gauge and thereafter clamped, side registration of the strip having already been effected before the clamping operation by air cylinders mounted at the back and front of the machine and controlled by push button.

After clamping, the gap gauge is raised and the moving head of the welder closed up to the point where contact is made at the strip ends.

The welding operation is then initiated by push button, when flashing and final forging are automatically applied, and a strip width of 50 in. by 0.140 in. thick is completed in 10 sec.

At the completion of the weld, the clamps are raised and the weld is passed along to the upset-removing machine which comprises a clamping system with two routing heads for the simultaneous removal of the weld upset from the top and underside of the strip within the surface limits. After the weld upset has been removed, the strip is then passed on to the upcoiler.

The welding operation is then repeated until such time as a large coil of strip is available for ultimate transfer to the mill reduction line.

The advantages of flash-butt welding as applied to aluminium strip for coil build-up lines are that large coils can be rapidly built up with welds of high strength values, achieved by push-button operation and requiring no special skill on the part of the operators.

Coil Handling

A diesel-operated fork lift truck fitted with an arm to enter the bore of the finished coil is used to transport the welded coil to the Sendzimir mill building, where a storage space is provided. This truck, supplied by Shelvoke and Drewry, is used also to handle coils in the flow line to and from the mill and coil annealing furnace, and to the cut-to-length line.

Sendzimir Mill

Two A.E.I. 900-h.p., d.c. motors in tandem drive the Sendzimir mill, which was supplied by W. H. A. Robertson and Co. Ltd., and each winder is driven by three A.E.I. 350-h.p., d.c. motors in tandem to provide a maximum tension of 25,000 lb. By means of an electrically operated disengaging coupling the inboard motor may be used on its own to provide the lower tension values up to

8,000 lb. when lighter-gauge material is being rolled.

Provision has been made for the automatic control of tension by the inclusion of load cells, one being fitted to each of the two deflector rolls, over which the tensioned strip passes.

The mill drives are supplied by four d.c. generators driven by an 11-kV., 3,500-h.p. motor and all the generators and mill drive motors and their control panels, supplied by Associated Electrical Industries Ltd., are housed in a pressurized motor room. Cooling air is drawn through a Visco filter unit and discharged into a wind tunnel beneath the motor room by four 25-h.p. axial-flow fans. This air is fed to all motors and generators, and the discharge of the resultant air pressure built up in the motor room is controlled by electrically-operated roof ventilators which are under the control of the motor-room attendant. A glazed partition is fitted between the mill bay and the motor room; this was supplied by The Ayrshire Dockyard Co. Ltd.

As with other Sendzimir mills, it is possible to change the actual work rolls in less than one minute, so that the last pass can be made with highly finished rolls which produce a mirror surface to the strip. Rolls are ground and polished on a Naxos Union roll grinder specially installed for this purpose and purchased through Wickman Ltd. A hydraulically-operated form of crown adjustment is fitted which provides a range of camber control to the back-up roll assemblies and consequent control of strip shape. It is possible to adjust the camber to obtain absolute uniform transverse gauge in the strip throughout the range of reductions and material tempers. Thickness gauges supplied by the Baldwin Instrument Co. Ltd., using Strontium 90 as a source, are used to indicate strip gauge and variation to the operator.

Hydraulic and lubrication supplies to the entry section, comprising a pay-off unit and feeder unit, and to the mill and winders, are obtained from pump units and their associated tanks with a combined capacity of 16,000 gal. Rolling oil is supplied to the mill at 677 gal. per min. at 150 lb. per sq. in. and is thermostatically controlled to maintain its temperature. Cooling is achieved with two Heenan and Froude water coolers in conjunction with two Serck heat exchangers. The rolling-oil tanks were manufactured to Birmetals' own design by The Globe Tank and Foundry Ltd., and are lagged with bonded Fibreglass and clad with sheet steel. Flameproof immersion heaters made by Birmetals' electrical department are fitted to both clean- and dirty-oil tanks and form part of the automatically controlled temperature regulating system.

A by-pass filtration system developed by Birmetals maintains a clean supply of rolling oil, which in this type of mill serves also as a lubricant to the mill back-up bearings. The whole of this oil handling equipment was installed by Birmetals' engineering department. All motors in any way associated with the rolling oil are flameproof construction and wired in Pyrotenax cable.

The oil cellar is fitted throughout with automatically operated CO_2 fire extinguishing equipment supplied and fitted by The Walter Kidde Co. Ltd., and a similar installation is fitted to the mill arranged for hand starting by the mill operator. Plant for the ventilation of the cellar and fume extraction from the mill was supplied by The Industrial Fan and Heater Co. Ltd.

Lubrication Problems

The lubrication of a Sendzimir strip mill poses a unique problem in that the rolling fluid must also serve as lubricating oil for the tanks of roller bearings.

In any rolling mill the rolling fluid is of prime importance since it determines not only the surface finish obtained on the rolled metal but also greatly influences the reductions which may be taken, the working speed of the mill, and the ease with which clean annealing of the metal may be achieved. Unfortunately, the fluids which most readily fulfil these requirements do not meet the traditional specifications for roller-bearing lubricants. It is apparent, therefore, that in order to achieve correct lubrication of a mill of this type a compromise must be reached.

After detailed consideration of the factors involved, in consultation with Birmetals Ltd., Mobil Oil Co. Ltd. recommended the use of an advanced lubricant under the name of Genrex 404D. This is a low-viscosity, light-coloured fluid designed to fulfil all the various conflicting requirements. The soundness of this recommendation may be judged by the fact that after 12 months' use the 14,000-gallon charge is still in excellent condition, the bearings have suffered no deterioration, and the rolling and clean annealing performance exceed the original stated requirements.

The only other lubrication problem encountered with this mill concerned the possible detrimental effects of contamination of the rolling fluid by oil from the hydraulic system. This problem was solved by charging the hydraulic system with a fluid closely similar to the Genrex 404D. By this means it has been possible to ensure that no trouble due to this cause has been, or will be, encountered.

Coil-annealing Furnace

Intermediate annealing is carried out where necessary in the coil-annealing furnace, designed to Birmetals' requirements and manufactured by Stordy Engineering Ltd., which is rated at 550 kW. with a capacity of 8,000 lb. an hour. The furnace will hold 12 coils of 8,000 lb. each when working

on a continuous cycle. Upon being discharged from the high-temperature zones at 450° C. the annealed coils pass through successive preheating zones, each one of which is a separate chamber closed off by doors and occupied also by an ingoing coil. The heat transfer which takes place effectively reduces the electrical loading for orthodox batch annealing to a little over half the normal figure.

The furnace itself comprises a cooling chamber, three preheating chambers and the furnace chamber proper, each compartment being isolated from the adjoining ones by means of vertically rising insulated doors which have a motorized operation from an adjustable timer.

The principle around which the furnace has been developed is to make use of the heat in the annealed coils for preheating the coils to be annealed and the furnace has, therefore, been provided with an ingoing lane which through the cooling section and the three preheat zones comprises a roller path on which the stillage carrying the coil is supported, a similar roller path being provided on the outgoing lane which is parallel to the ingoing one. Over the furnace section proper, which is designed to contain four stillages, the hearth is formed of heat-resisting cast iron with a developed system of guides engaging with the stillage faces. At the ingoing position is provided a pusher gear, the pusher head engaging with a stillage face and progressing the line of stillages through the various preheat zones to the furnace proper. At the last station in the furnace section a transverse pusher gear is provided, with a further pusher gear to progress the stillages through the outgoing lane, and at the discharge table an overhead hoist on a swinging gib is arranged to transfer the unloaded stillages to the loading position.

Assuming a coil has been charged into the stillage at the ingoing position then at the dictate of the previously mentioned timer all the doors between the various sections are automatically raised and having reached the full open positions the charging pusher progresses the line of stillages through the charging lane. The second operation is for the last stillage in the furnace section to be moved transversely to a position opposite the outgoing lane. At the end of the selected time interval the doors once more are automatically operated, the outgoing lane pusher delivering one stillage to the unloading platform, the ingoing charging pusher then operating, followed by the transverse pusher, the doors once more automatically closing. The whole sequence is carefully interlocked so that no pusher can operate until all doors are in the fully open position and that the transverse and outgoing lane pushers can only operate as and when spaces are available in the respective operating positions.

In so far as the thermal operation is concerned the first zone is a cooling zone only and is provided with axial flow cooling fans introducing air from outside the shop area and discharging to outside atmosphere after an intensive application across the hot coil. Each of the preheating zones is arranged so that a hot coil on the outgoing lane is immediately opposite a cold coil on the ingoing lane, each zone being provided with a centrifugal fan with the suction eye approximately on the centre-line of the coil in the stillage and delivering through an intensive duct system employing high velocity nozzles immediately opposite the hot coil, the high velocity airstreams receiving heat from the hot coil and transferring thermal energy to the cool coil so that when a coil in the ingoing lane first reaches the furnace zone proper, it has been preheated almost to annealing temperature.

Each of the preheat zones is provided with a 50-kW. boost heater which is primarily designed to operate when the furnace is first being charged and when there are no hot coils available.

The furnace proper is provided with two centrifugal circulating fans, each fan circuit being complete with a 200-kW. electric heater mounted in the supply duct system, this duct system being very similar to that described for the preheat zone but manufactured throughout in heat-resisting steel, as also are the fan runners, shafts and casings.

Each heater battery has been arranged so that for maintenance purposes the whole unit can be removed through the roof of the furnace and are of a design which has been developed and made by Stordy Engineering Ltd. The total rating of each heater battery is suitably sub-divided to provide closeness of control, each heater sub-division being provided with its own contactor equipment.

The economy which can be expected from the design will be apparent since use is made of the heat which of necessity has to be given to the metal to perform the annealing operation and which in the case of batch-type furnaces of conventional design is wasted, and furthermore at the unloading position the coil is in a cool condition. The cost per ton of metal treated is very significantly less than with the most efficient conventional batch-type furnace.

Sheet-annealing Furnace

The flash annealing furnace will take sheets up to 8 ft. wide, or two sheets of 4 ft. side by side, and has four heating zones totalling 600 kW. Continuous nickel-alloy tapes carry the sheets through the furnace, which is 40 ft. long, and its extension, in the form of a cooling chamber, which is 42 ft. long. Extensive tests were carried out during the commissioning stages to ensure the maximum uniformity of material heating across the width. The conveyor speed may be varied from zero up to

(*Continued in page* 456)

8,000 lb. when lighter-gauge material is being rolled.

Provision has been made for the automatic control of tension by the inclusion of load cells, one being fitted to each of the two deflector rolls, over which the tensioned strip passes.

The mill drives are supplied by four d.c. generators driven by an 11-kV., 3,500-h.p. motor and all the generators and mill drive motors and their control panels, supplied by Associated Electrical Industries Ltd., are housed in a pressurized motor room. Cooling air is drawn through a Visco filter unit and discharged into a wind tunnel beneath the motor room by four 25-h.p. axial-flow fans. This air is fed to all motors and generators, and the discharge of the resultant air pressure built up in the motor room is controlled by electrically-operated roof ventilators which are under the control of the motor-room attendant. A glazed partition is fitted between the mill bay and the motor room; this was supplied by The Ayrshire Dockyard Co. Ltd.

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Coil-annealing Furnace

Intermediate annealing is carried out where necessary in the coil-annealing furnace, designed to Birmetals' requirements and manufactured by Stordy Engineering Ltd., which is rated at 550 kW. with a capacity of 8,000 lb. an hour. The furnace will hold 12 coils of 8,000 lb. each when working

on a continuous cycle. Upon being discharged from the high-temperature zones at 450° C. the annealed coils pass through successive preheating zones, each one of which is a separate chamber closed off by doors and occupied also by an ingoing coil. The heat transfer which takes place effectively reduces the electrical loading for orthodox batch annealing to a little over half the normal figure.

The furnace itself comprises a cooling chamber, three preheating chambers and the furnace chamber proper, each compartment being isolated from the adjoining ones by means of vertically rising insulated doors which have a motorized operation from an adjustable timer.

The principle around which the furnace has been developed is to make use of the heat in the annealed coils for preheating the coils to be annealed and the furnace has, therefore, been provided with an ingoing lane which through the cooling section and the three preheat zones comprises a roller path on which the stillage carrying the coil is supported, a similar roller path being provided on the outgoing lane which is parallel to the ingoing one. Over the furnace section proper, which is designed to contain four stillages, the hearth is formed of heat-resisting cast iron with a developed system of guides engaging with the stillage faces. At the ingoing position is provided a pusher gear, the pusher head engaging with a stillage face and progressing the line of stillages through the various preheat zones to the furnace proper. At the last station in the furnace section a transverse pusher gear is provided, with a further pusher gear to progress the stillages through the outgoing lane, and at the discharge table an overhead hoist on a swinging gib is arranged to transfer the unloaded stillages to the loading position.

Assuming a coil has been charged into the stillage at the ingoing position then at the dictate of the previously mentioned timer all the doors between the various sections are automatically raised and having reached the full open positions the charging pusher progresses the line of stillages through the charging lane. The second operation is for the last stillage in the furnace section to be moved transversely to a position opposite the outgoing lane. At the end of the selected time interval the doors once more are automatically operated, the outgoing lane pusher delivering one stillage to the unloading platform, the ingoing charging pusher then operating, followed by the transverse pusher, the doors once more automatically closing. The whole sequence is carefully interlocked so that no pusher can operate until all doors are in the fully open position and that the transverse and outgoing lane pushers can only operate as and when spaces are available in the respective operating positions.

In so far as the thermal operation is concerned the first zone is a cooling zone only and is provided with axial flow cooling fans introducing air from outside the shop area and discharging to outside atmosphere after an intensive application across the hot coil. Each of the preheating zones is arranged so that a hot coil on the outgoing lane is immediately opposite a cold coil on the ingoing lane, each zone being provided with a centrifugal fan with the suction eye approximately on the centre-line of the coil in the stillage and delivering through an intensive duct system employing high velocity nozzles immediately opposite the hot coil, the high velocity airstreams receiving heat from the hot coil and transferring thermal energy to the cool coil so that when a coil in the ingoing lane first reaches the furnace zone proper, it has been preheated almost to annealing temperature.

Each of the preheat zones is provided with a 50-kW. boost heater which is primarily designed to operate when the furnace is first being charged and when there are no hot coils available.

The furnace proper is provided with two centrifugal circulating fans, each fan circuit being complete with a 200-kW. electric heater mounted in the supply duct system, this duct system being very similar to that described for the preheat zone but manufactured throughout in heat-resisting steel, as also are the fan runners, shafts and casings.

Each heater battery has been arranged so that for maintenance purposes the whole unit can be removed through the roof of the furnace and are of a design which has been developed and made by Stordy Engineering Ltd. The total rating of each heater battery is suitably sub-divided to provide closeness of control, each heater sub-division being provided with its own contactor equipment.

The economy which can be expected from the design will be apparent since use is made of the heat which of necessity has to be given to the metal to perform the annealing operation and which in the case of batch-type furnaces of conventional design is wasted, and furthermore at the unloading position the coil is in a cool condition. The cost per ton of metal treated is very significantly less than with the most efficient conventional batch-type furnace.

Sheet-annealing Furnace

The flash annealing furnace will take sheets up to 8 ft. wide, or two sheets of 4 ft. side by side, and has four heating zones totalling 600 kW. Continuous nickel-alloy tapes carry the sheets through the furnace, which is 40 ft. long, and its extension, in the form of a cooling chamber, which is 42 ft. long. Extensive tests were carried out during the commissioning stages to ensure the maximum uniformity of material heating across the width. The conveyor speed may be varied from zero up to

(*Continued in page* 456)

Development and Manufacture of a FOUR-WAY DRAIN UNIT

By "TARENTFORD"

THE production of conical members in sheet-metal work presents few serious problems in layout and manufacture, but occasionally a slight modification to the design can create much more thought and work than is at first apparent. The development and manufacture of a typical four-way drain unit (Fig. 1) is such an instance. Taking the pieces singly the cutting and rolling introduces elementary operations, but as the smaller cone is set on the sloping sides of the larger detail, both parts require a more complicated layout in order to obtain a balanced component.

The initial operations were, the spinning of the larger cone, a wood former being used attached to the orthodox type of faceplate, and trimming the outer rim and facing to make the small hole at the apex. Both operations were carried out on the former after four holes for wood screws had

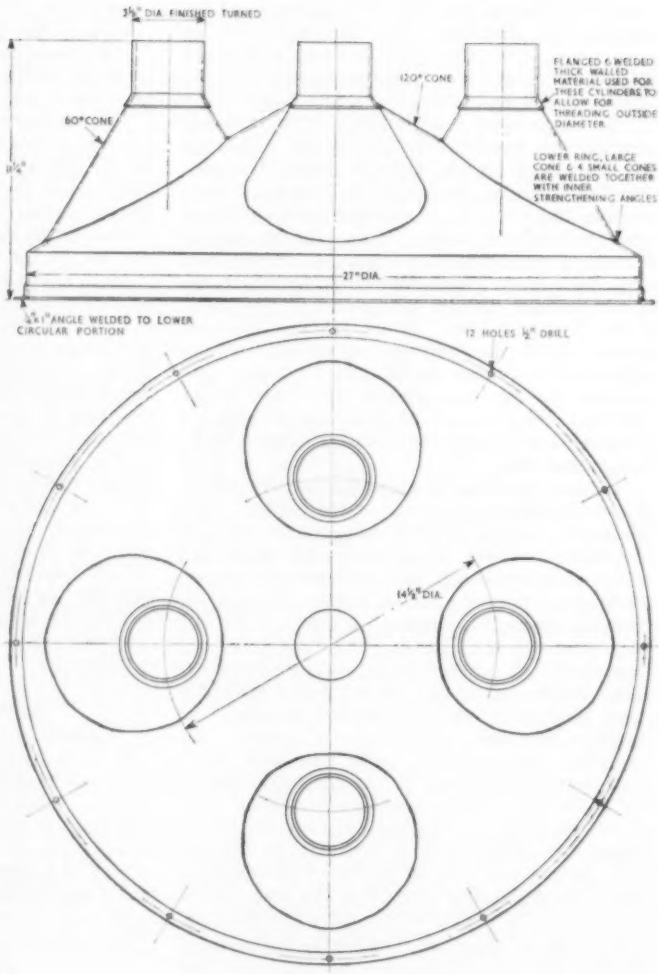

3½" DIA. FINISHED TURNED
60° CONE
120° CONE
FLANGED & WELDED THICK WALLED MATERIAL USED FOR THESE CYLINDERS TO ALLOW FOR THREADING OUTSIDE DIAMETER
LOWER RING, LARGE CONE & 4 SMALL CONES ARE WELDED TOGETHER WITH INNER STRENGTHENING ANGLES
27" DIA.
½" x 1" ANGLE WELDED TO LOWER CIRCULAR PORTION
12 HOLES ½" DRILL
14½" DIA.

Fig. 1.—The assembly drawing of the drain unit indicating the four extensions where the outside diameter is screwed for a hose fitting

been drilled in the corresponding positions of the four cones. These holes, which were subsequently cut away, provided an easy clamping medium for the two operations, made necessary by a lack of holding equipment usually associated with spinning lathes.

The first stage of the development demands the construction of an intersection line between the two cones; they are, therefore, set down as shown in Fig. 2, without the circular pieces that make up the remainder of the assembly. Two intersection points will appear at F and M, and lines are drawn from these to the centre-line of the small cone and a number of divisions made as shown at points 11 to 16. These are projected across to the centre-line of the large cone where they appear as F, 10, 9, 8, 7, and M; the letters being the two positions of the aperture on that particular centre-line.

Next with 10 as the centre, the radius 10 to 17 is struck, and an intersection is made by taking 15 as the centre and radius 15 to 18 and crossing the two lines at 19. From this intersection, a line is dropped, shown dotted for clearness, to the horizontal line which runs across the two cones from 10 to 18 and shown as G on the drawing. This is the first point in the construction of the intersection curve between the two cones, and the remainder are found by adopting a similar process, giving the points marked as H, K and L on the intersecting curve between.

The pattern drawing for the small conical section is now undertaken, and projected up to view B. For convenience in layout the same point X is taken as the centre for the radii. XM is produced until it meets the base of the main cone at O, then with centre Z and radius ZO a semi-circle is constructed underneath view A and divided into six equal arcs. The radius XO is struck from X and the semi-circle in view B constructed and divided into 12 equal arcs. This is considered general practice when dealing with articles of this type and the semi-circle gives exactly the same result as the full circle.

(*Continued in page* 456)

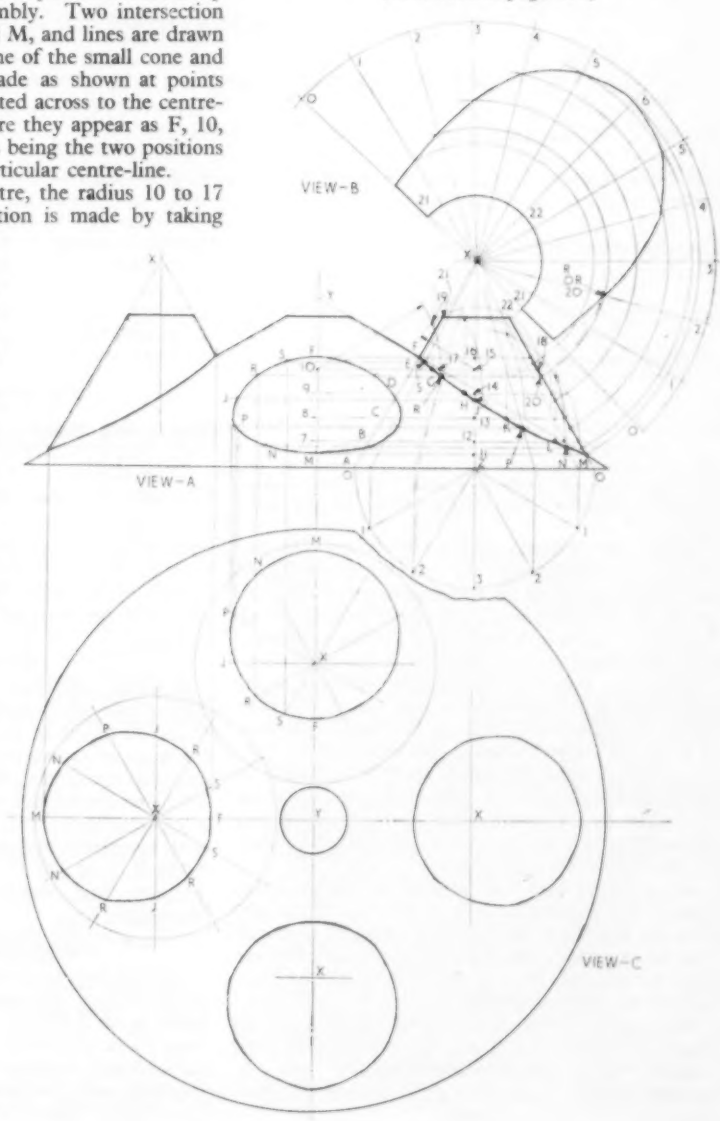


Fig. 2.—A drawing illustrating the methods needed for the main cone, and the small cone development

Development and Manufacture of a Four-way Drain Unit

(*Continued from page* 455)

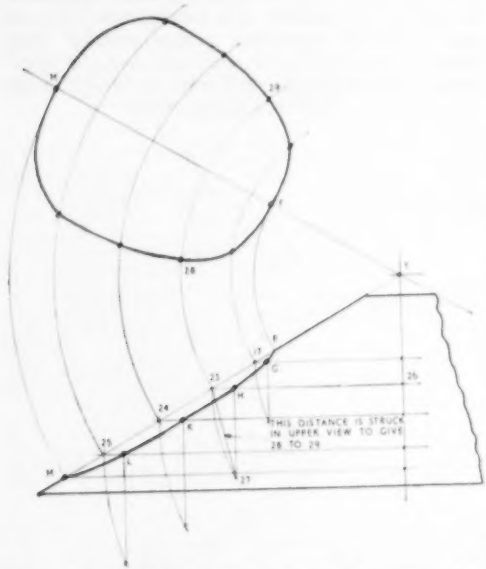


Fig. 3.—A sketch depicting the construction necessary for the holes in the side of the large cone. This method gives the hole "in the flat" from which a template is easily made

The six arcs on the semi-circle radius ZO are projected vertically on to the line OO and produced to point X, crossing the previously drawn curve at points S, R, P, and N. The vertical intersection of XZ on the curve is lettered J. All these points are projected horizontally to the side of the small cone. Taking one point as an example, the horizontal projection of point R cuts the line XM at 20 ; with centre X and radius X20 an arc is drawn on to view B to cut the second division bounded by X2. This construction is emphasized by the inclusion of hatching commencing in view A and following on into view B. The remaining positions are found by working in a similar manner using all the points on the side of the small cone.

As spinning had been carried out on the main cone it was essential to make a template of the hole "in the flat" and then bend it carefully to match the sloping side ; marking round the set template gave the desired shape of the hole which was then drilled out and finally filed to size.

In contrast the work of finding this hole profile is relatively simple, and to avoid confusion with the various points already drawn on the view A, another sketch is added in an endeavour to illustrate this description clearly.

Fig. 3 shows the intersection points once again at F, G, H, K, L and M with the curve added, and these are projected horizontally to the sloping side of the cone to make points F, 17, 23, 24, 25 and M. Taking point 23 as an example, a radius is struck from 26 on the centre line of the cone equal to 26 to 23, and if a line is dropped from H until it meets this curve at 27, the distance obtained, 23 to 27, is the required dimension for the hole aperture.

A line is struck up from Y and semi-circles made from Y starting from the points F, 23, 24, 25 and M, and from the line FM and using the arc 23 to 27, the points 28 and 29 are struck, the remaining points round the aperture being secured in the same way.

The template was set to scribed lines, after being bent by hand, to fit the slanting side and the small cones eventually lightly welded in position. The extensions of these smaller cones, which are afterwards welded in position, were threaded prior to attaching them to the cones as they then made connections for drain hoses. The threading operation was performed in this manner because of the difficulty in carrying out the work when the four parts are secured to the main cone.

High-speed Rolling of Aluminium Alloy Strip

(*Continued from page* 453)

a maximum of 100 ft. per min. The equipment was designed, manufactured and installed by G.W.B. Furnaces Ltd. Material leaving this furnace is inspected on both sides before being passed to the despatch bay, and ultimately to the customer.

Slitting Line

Finished coils from the mill bay are passed to a storage area for loading into the cut-to-length line. Provision has been made for a slitting line, to be fed from the same area, which will supply 52-in. dia. coils slit to any width down to 1 in. This will have a maximum line speed of 800 ft. per min. and a thickness range from 0.080 in. to 0.005 in. Strip to be supplied in coil form will have a length of over 7,000 ft. at 0.020 in. thick. This unit is being designed and supplied by Auxiliary Rolling Machinery Ltd.

Cut-to-Length Line

The cut-to-length line has a maximum strip speed of 350 ft. per min. and a thickness range of from 0.080 in. to 0.010 in., and will cut to any length from 24 in. to 192 in. It is a Hallden unit manufactured and supplied by W. H. A. Robertson and Co. Ltd., with motors and M.G. set supplied by The English Electric Co. Ltd.

PROJECTION WELDING OF LOW-CARBON MILD-STEEL SHEET

by G. A. PHIPPS, A.M.Inst.W.

(A Paper submitted to Commission III "Resistance Welding" of the I.I.W.)

THIS revision of the section of the British Welding Research Association's Code of Practice (T.30) on the projection welding of mild-steel sheet extends the scope of the original recommendations. Certain amendments and additions have been made in the light of observations made by Commission III of the International Institute of Welding and further extensive experiments carried out by the British Welding Research Association. It is proposed to revise other sections of this Code of Practice at a later date.

Introduction

PROJECTION welding is a method of resistance welding in which current flow and heating during welding are localized by the form of the parts being welded rather than by the electrodes in contact with the work. As shown in Fig. 1, this is usually accomplished by a projection on one or both of the workpieces, and it is from this fact that the process derives its name. The projection may be formed by pressing, in the case of sheet metal, by forging or machining from solid pieces, or on the edge of strip by using special shears or punches. The advantages offered by projection welding compared with spotwelding are as follows :

(1) Ease of obtaining satisfactory heat balance for welding difficult combinations of dissimilar thickness ;

(2) More uniform results in many applications, particularly where welds are required at close pitch ;

(3) Several welds can be made simultaneously ;

(4) Longer electrode life and lower electrode maintenance ;

(5) The process lends itself to the use of assembly fixtures ;

(6) Finished appearance is often improved ;

Fig. 1

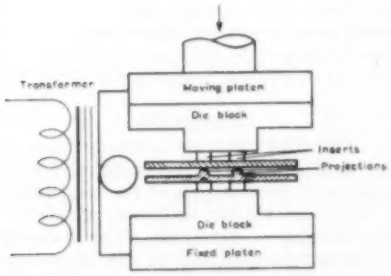
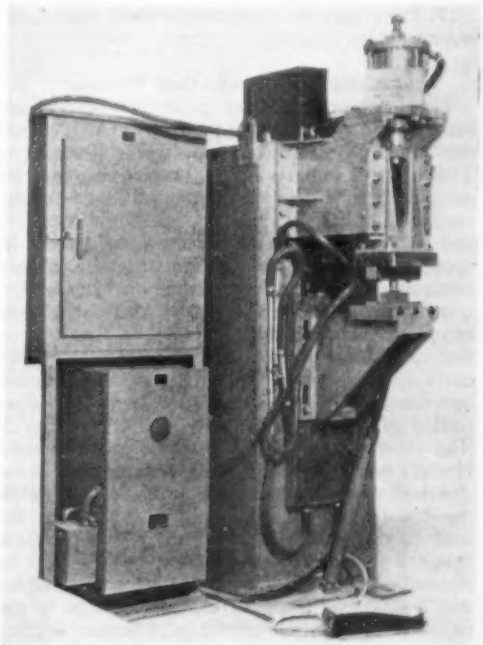


Fig. 2.—*Typical projection welding machine in the British Welding Research Association laboratories*



* Prepared for the B3 COMMITTEE ON PROJECTION WELDING OF STEELS—APRIL 1958—(British Welding Research Association)

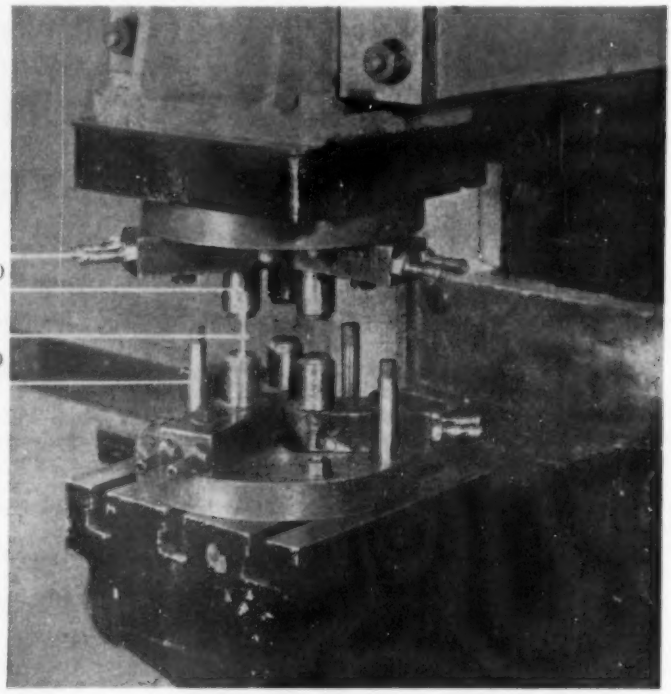


Fig. 3.—Electrode assembly used by the British Welding Research Association for welding triple projections. Showing (a) water cooling system; (b) copper alloy electrodes with tungsten-copper inserts; (c) component locating pin with insulated top

(7) Parts may be projection welded that could not be welded otherwise.

Machines for Projection Welding

The machines made for projection welding are basically the same as those for spot welding, except that they are generally more massive in all respects. The current capacity of the machines must be generally greater, and the mechanical rigidity of the machines must be increased, since the currents and loads involved are considerably higher than in spot welding due to the fact that several welds are made simultaneously. A projection-welding machine usually has a shorter throat and, therefore, lower secondary loss than a spot welder, so that a given size of transformer will give a greater secondary current. The short throat is also advantageous in withstanding the heavy applied loads. An illustration of a typical machine is given in Fig. 2. The moving head of the machine must be rigid laterally but must be light and freely moving in the direction of the applied loads so that it will follow the collapse of the projection and maintain the load on the weld as it is formed. It is desirable that the downward speed of the head should be controllable in order to avoid excessive impact which may lead to premature cold collapse of the projections. Current control in projection welding is generally more critical than in spot welding, and as the number of projections being welded at one time is increased, the control of current becomes even more critical. It is essential, therefore, that some accurate timer is used to control the duration of the current and also that the magnitude of current should be controllable in fairly small stages. This may be achieved by a number of tappings on the primary side of the welding transformer, sometimes supplemented by phase-shift heat control. Special machines such as the 3-phase frequency changer type, or single-phase machines with slope control of current, may be advantageous in some applications. With slope control, the current increases gradually at the beginning of welding, thus limiting the rate of projection collapse so that load may be maintained during the formation of the weld.

Electrodes

The electrodes used are normally large relative to the weld which is being made, and therefore, comparatively little forging of the weld takes place after the projection has collapsed, and little or no surface marking is produced. The material used for such electrodes should be one of the specially developed copper alloys*, having a conductivity

* International Annealed Copper Standard, which is a specific resistance of 1.7241 microhm cm. at 20° C.

TABLE I—*Some Sheet Steels in Common Use for Projection Welding*

Specification	Carbon max. (per cent)	Silicon max. (per cent)	Manganese max. (per cent)	Sulphur max. (per cent)	Phosphorus max. (per cent)	Others, (per cent)
B.S. No. S.84*	0.12	0.20	0.50	0.05	0.05	Ni 0.30 max.
DTD 330	0.08	0.20	0.40	0.05	0.05	—
B.S. En. 2A	0.12	—	0.50	0.05	0.05	—
B.S. En. 2A/1	0.10	—	0.50	0.04	0.04	—

* If nickel is greater than 0.1 per cent trouble may be experienced.

from 50 to 85 per cent I.A.C.S. with corresponding hardnesses between 240 and 110 D.P.N., which will give reasonable electrode life. If a particularly long life is required the use of a more expensive material such as tungsten-copper may be desirable. Such material should be in the form of inserts generally not less than $\frac{1}{4}$ in. thick, and attached by brazing to a substantial backing of one of the previously mentioned alloys. If tungsten-copper inserts are used it is essential that the components to be welded should be clean. The area of contact between the insert and the components to be welded should be at least four times the weld area, and contact over this area must be good since, if the contact is poor, local hot spots will occur, with consequent burning and disintegration of the insert at these points. In all cases, electrodes must be efficiently water-cooled, and must be accurately

Outline of punch and die which may be used for forming projections

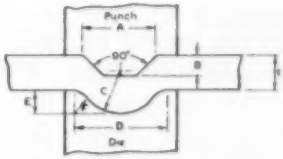


TABLE II—Projection sizes—*All dimensions follow a series of "Preferred Numbers" found in British Standard B.S. 2045. Material thickness increases by 33 per cent, series R80/11. Projection dimension A increases by 15 per cent, series R80/5. Projection dimensions B to F increase by 12 per cent, series R80/4.*

Thickness range (in.)	Gauges (s.w.g.)	Projection Dimensions, in. A	B	C	C	E and F	Projection No.
0.021—0.027 ..	24	0.103	0.040	0.050	0.118	0.028	0.6
0.028—0.037 ..	22 / 20	0.118	0.045	0.056	0.132	0.031	0.8
0.038—0.052 ..	18	0.136	0.050	0.063	0.150	0.035	1.0
0.053—0.071 ..	16	0.160	0.056	0.071	0.170	0.039	1.5
0.072—0.099 ..	14	0.185	0.063	0.080	0.190	0.044	2.0
0.100—0.134 ..	12 / 10	0.212	0.071	0.090	0.212	0.049	3.0

TABLE II—*continued*

Thickness range (mm.)	Gauges (mm.)	Projection Dimensions (mm.) A	B	C	D	E and F	Projection No.
0.52—0.70	0.6	2.58	1.00	1.25	3.00	0.71	0.6
0.71—0.96	0.8	3.00	1.12	1.40	3.35	0.80	0.8
0.97—1.29	1.0 / 1.2	3.45	1.25	1.60	3.75	0.90	1.0
1.30—1.82	1.5 / 1.75	4.00	1.40	1.80	4.25	1.00	1.5
1.83—2.46	2.0	4.62	1.60	2.00	4.75	1.12	2.0
2.47—3.39	2.5 / 3.2	5.30	1.80	2.24	5.30	1.25	3.0

The dimensions are approximate, with compatibility tolerances of ± 0.003 in., (± 0.08 mm.), with the exception of E, which must remain to a close tolerance. Dimension D is included for toolmaking purposes.

aligned under load in the welding machine. If this is not done, poor quality welds may be produced and electrode life will be reduced considerably. It should also be noted that the surface finish of the electrodes on initial installation can have an important effect on the electrode life, and it is desirable that as smooth a surface as possible should be obtained, for example, by surface grinding. The electrodes may be incorporated in jigs or fixtures for locating parts in the machine, but care must be taken that any such locating devices do not form a current path alternative to the projections. The use of magnetic material for jigs and fixtures must be avoided, as such material, if in the machine throat, will get hot due to the eddy currents induced every time a weld is made, and will also reduce the secondary current of the machine by increasing the inductive losses.

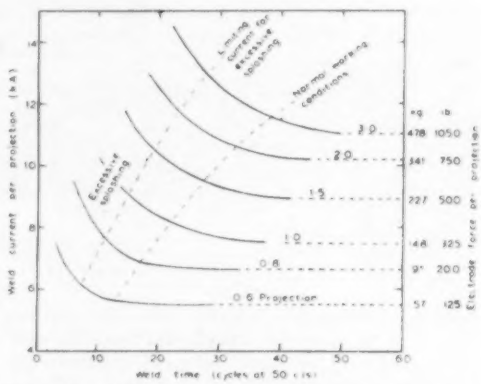
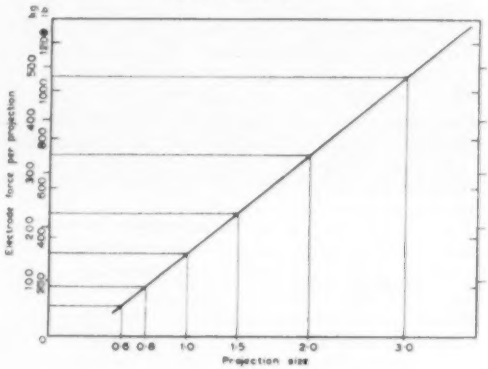


Fig. 4 (above).—Range of conditions for projection welding mild steel sheet

Fig. 5 (below).—Relationship between electrode force and projection size



REVISED SECTION (No. 1)
ONE, TWO OR THREE PROJECTIONS IN LOW-CARBON STEEL SHEET

Materials

Projection welding of mild-steel sheet is mainly carried out using material with a carbon content not exceeding 0.1 per cent. If the carbon content is greater than this, particularly if it is associated with high percentages of manganese (greater than 0.6 per cent) and nickel, chromium, molybdenum, etc. (any one greater than 0.1 per cent), difficulty may be experienced due to the formation of extremely hard and brittle welds. Generally, the thicker the material being welded, the higher the carbon content which can be tolerated. Examples of steels which may be used successfully for pro-

TABLE III—*Proposed Projection Welding Conditions*

Sheet Thickness	in.	0.021—0.027*		0.028—0.037		0.038—0.052		0.053—0.071		0.072—0.099		0.100—0.134	
	mm.	0.55—0.7		0.72—0.9		0.92—1.3		1.32—1.8		1.81—2.51		2.54—3.4	
Projection size		0.6		0.8		1.0		1.5		2.0		3.0	
Electrode load per projection	lb.	125		200		325		500		750		1,050	
	kg.	57		91		148		227		341		478	
		Time cycles	Current projection kA*	Time cycles	Current projection kA	Time cycles	Current projection kA	Time cycles	Current projection kA	Time cycles	Current projection kA	Time cycles	Current projection kA
		8	6.0	7	9.0	12	9.7	17	10.9	23	11.8	28	12.9
		13	5.8	17	7.0	22	8.2	27	9.7	33	10.7	38	11.6
		18	5.7	27	6.6	32	7.5	37	9.0	43	10.2	48	11.0

* For welding two or three projections in the 0.6 projection size the current per projection should be 80 per cent of the values given. Evidence in production suggests that these thicknesses are possibly just below the limit at which the projection shape specified is really suitable. 50 cycles = 1 second.

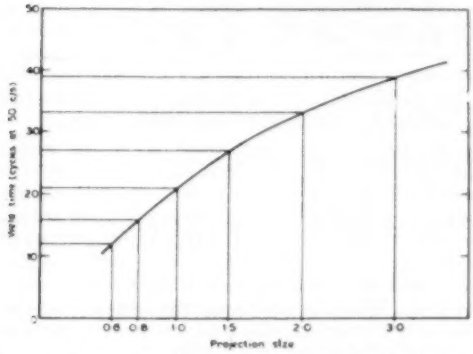


Fig. 6.—Relationship between weld time and projection size

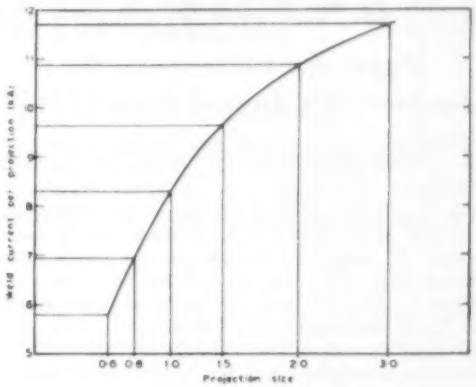


Fig. 7.—Relationship between weld current and projection size

jection welding are given in Table I. Welds from a single application of current in higher carbon materials (more than 0.1 per cent), may be satisfactory, but a post-heat treatment may be necessary in order to temper the weld and heat-affected zone.

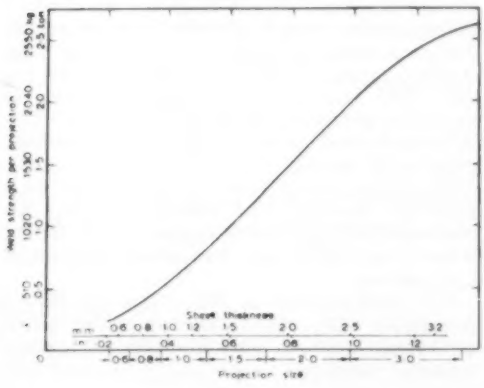
An important factor for successful projection welding is the cleanliness of the material, that is, there should be no dirt, grease, oxide scale or rust on the surfaces.

Projection Sizes

Recommendations Based on Experimental Work by the British Welding Research Association

The shapes of the projections which should be used for welding flat mild steel sheets are shown in Table II, with an outline of the punch and die which may be used for forming the projections. These forms are to be preferred and can be used successfully for the majority of applications. The accuracy of the projection heights in any one component is of prime importance, and to obtain the best results the individual heights should be within 0.001 in. of each other in each cluster of projections. The pitch of projections can have an important effect on the strength of the joint produced and on the welding conditions required. As the projection pitch is reduced, the tendency of individual welds to grow towards one another becomes more pronounced, and eventually a point may be reached at which a single continuous weld is formed, in which case it is better to use either a smaller number of individual projections or a different type of projection such as a line or Y form.

Fig. 8.—Relationship between weld strength and projection size



Welding Conditions

A range of projection-welding conditions for each projection size is given in Table III and by the curves in Fig. 4. The relationships between the welding conditions and projection sizes are shown in Figs. 5, 6 and 7. The weld strengths drawn in Fig. 8 are the minimum which may be consistently expected between two flat sheets using the proposed welding conditions; if other conditions giving lower strengths are adopted less consistency may also be expected. The exact strength obtained in any particular application will depend upon the design of the component being welded.

In all cases burrs on the edges of pressings and other distortions which may lead to current passing between the components at points other than the projections must be avoided, since any such current shunting will result in low and inconsistent weld strengths.

B.N.F.M.R.A.

Some Extracts from the Association's Annual Report, 1959

THE year under review was the last of the five years during which Dr. Maurice Cook was Chairman of the Council. A fitting climax to Dr. Cook's term of office was the occupation during the year of the new laboratory block, which completes the original building plan on the Euston Street site. This was opened by Sir Alexander Fleck on May 13, and the opportunity was taken to invite representatives of members to visit the laboratories and to familiarise themselves with the facilities available and the work in progress. Mr. F. C. Braby took over the chairmanship from Dr. Cook in January of this year.

Process Control

Instrumentation

Maximum effort has been concentrated during the latter half of the year on the B.N.F. Plating Gauge for rapid non-destructive thickness testing of electro-deposits. The original instrument, which had proved satisfactory as a laboratory tool, has now been successfully modified so that readings can be taken rapidly by unskilled operators and it is now suitable for industrial quality control.

Further work on the theory of eddy current testing has proceeded and demonstrations of the testing of tubes have been staged. Good progress has also been made in the development of methods of emissivity correction in the measurement of the surface temperature of aluminium during hot-working operations, sufficient to justify attempts to try out the techniques in industrial operations.

End Uses

Corrosion and Protection

Non-ferrous metals owe many of their end uses to their inherent resistance to corrosion, and much of the year's work has been devoted to developing still better alloys for specific purposes, defining the limits of use of known materials, and improving the method of application or the quality of protective coatings such as zinc, nickel or chromium.

Resistance to corrosion by waters is still of major importance. The copper alloys developed to resist corrosion in condensers operating in highly polluted estuarine waters are now undergoing service trials in ships and power stations. A gunmetal developed by the Association for its superior properties in other respects to existing alloys has been shown to be equal to Admiralty gunmetal in resistance to sea-water corrosion.

Many of the researches deal with the use of metals in domestic supply waters. Copper pipes initially free from internal films of either oxide or carbon have been found free from corrosion troubles in all waters except a few soft manganese-bearing waters, where pits may eventually develop after long service. The incidence of such troubles is trifling and this research has been concluded.

No success has been achieved in preventing dezincification of duplex brasses in certain types of water, but good progress has been made during the year in attempts to identify the water compositions which promote this attack. In addition to tests in synthetic waters, efforts are being made in co-operation with the Copper Development Association to obtain failed fittings from many areas to establish the supply waters in which duplex brass fittings can be used without fear of dezincification.

The examination of new types of zinc coating on hot-water tanks is still progressing slowly owing to the difficulty of devising an accelerated test which does not, because of the accelerating agent, produce a type of attack different from that occurring in service and therefore giving misleading results. Installations have been erected in certain districts where the natural water seems to give the right sort of attack relatively rapidly, but quick results cannot be expected.

The other line of galvanizing research, the production of heavy coatings on structural steel, has proceeded to the point where conditions for forming coatings in excess of 3 oz. per sq. ft. at all points have been defined.

The use of sprayed aluminium coatings on various alloys has been shown to be of great value in protecting against most forms of corrosion, though there remains some doubt to be cleared up about its complete efficacy against stress corrosion in one or two extremely severe conditions.

The main development in the field of electroplating has been the application of earlier work on conditions for depositing thicker crack-free chromium coatings. The resistance to blistering of nickel-chromium coatings on zinc-alloy die-castings has been shown to be greatly improved by the application of up to 0.00005 in. of chromium, deposited under conditions giving freedom from cracking, on an adequate nickel undercoat (not less than 0.001 in.). In view of the importance of improving quality of these finishes on the zinc-alloy die-castings used on cars, wide publicity has been given to this finding.

The basic study of bright nickel solutions using additions "labelled" with radioactive tracers has made sufficient progress to suggest several lines of future work which may lead to useful practical applications.

One other research in this section has been a comparison with outdoor exposure of the various accelerated corrosion tests available for electro-deposited coatings.

SHEET METAL DATA SHEET

6

Sheet Metal Rolling Machines–2

Compiled by J. W. Langton, M.B.E., B.Sc.(Lond.), M.I.Mech.E.

CONE ROLLS

FOR the rolling of small- to medium-sized cones, when there is a real difference between top and bottom diameters of the frustum, the cones are often rolled in rolls, similar in principle to the rolls described in the first sheet, but having conical rolls. The angle of these rolls is not of necessity strictly that of the cone to be rolled, some variations are possible, but it is not possible to define the variations here.

Hand and power versions are available, but they are not usually stocked, because of the variation in types of cones to be rolled.

SWAGING MACHINES

The term swaging machines is one used to cover machines used for various rotary operations beside swaging (which is the production of a bead) such as joggling or necking, wiring and closing, jennying or flanging. The nomenclature of these operations is fairly loose, but Fig. 3 shows a typical machine and some of the rolls in common use.

A swaging machine in principle is very simple, being merely a pair of shafts, one mounted above the other, and geared together. One shaft (the top) is in a housing adjustable within small limits in a vertical plane, to the other shaft which is fixed. The movement of the adjustable shaft is usually about a fixed pivot, so that the roll adjustment is not a truly vertical line, which point can affect some work particularly trimming or shearing.

By use of varying pairs of rolls on the shafts, various rotary operations can be done.

In **Hand Power Swagers,** the shafts are turned by hand by means of a handle on one shaft. In **Power Swagers,** the shafts are mechanically power driven.

Size and Capacity

Swaging machines are usually defined by giving maximum metal thickness to be swaged, and the depth of throat on the machines, from roll centre to back of the gap.

The metal thickness definition is rather a loose one, because obviously the rate of swaging should be coupled with it. It is difficult to do this because of the varied nature of the work, but the metal thickness specified does give some clue of the relative strengths of shafts and housings for various machines.

HAND MACHINES

There are at least three common groups of hand swaging machines.

Jennies or Burring Machines (Fig. 2)

These are the simplest type, and are usually single purpose machines used for jennying or throwing up small flanges. The rolls and shafts are usually integral, hence the single purpose. Used for gauges up 18 s.w.g. Throat depths are small, and not usually specified, but sometimes the diameter of rolls is given. (About 1 to 3½ inches diameter.)

Swaging Machines (Fig. 1)

The main specifications are gauge of work and depth of throat. Made for gauges up to 14 gauge and with throat depths up to 27 inches. May be geared or ungeared.

Machines may be supplied with sets of rolls as standard equipment, or minus rolls. Attachments can be supplied on some models for circle cutting and circular flanging.

Wiring Machines (Rotary)

Hand wiring machines are usually hand swaging machines, supplied complete with the necessary rolls to form the metal round the wire and close it (two operations). Specify

6 SHEET METAL DATA SHEET

Sheet Metal Rolling Machines — 2 (Cont.)

sheet metal maximum thickness and also maximum diameter of wire.

POWER SWAGING MACHINES

Not too common, but can be obtained for work on metal up to $\frac{1}{8}$ in. thick. Basic principle of the geared swage remains, and power operation is often by foot control. *Note.*—It is often easy to motorize hand machines for light work. The adjustment of the top spindle is still usually by hand.

Attachments for power swagers are more common, and the machines are then sometimes termed rotary combination machines. *Note.*—Most rotary operations call for a certain amount of "knack" for successful results.

SECTION-ROLLING MACHINES

Section-rolling machines in one concept, may be considered as a number of swaging machines mounted together, *i.e.* they consist of a number of pairs of spindles geared together mounted in a single frame. The number of pairs of rolls varies with the rotary work to be done, five being the minimum number as a rule, with no real limit on the maximum number.

Many shapes or sections can be rolled in the machines, as well as bending, hemming and similar work, each pair of rolls carrying out part of the total work. The allocation of the work to each pair of rolls is a matter of experience. For lighter work, the rolls may be overhung, permitting work of unlimited width to be passed through, or the rolls may be mounted between the shaft housings for greater rigidity. The machines are high-speed producers of sections.

Lock Forming Machines

These machines are essentially section rolling machines, and are usually offered with overhung rolls, double sided. One side has rolls and shafts integral for the lock form joint, and on the other side rolls may be fitted for other section rolled work.

Section rolling machines are not really intended for short length or small quantity work, and most deal with material thicknesses up to $\frac{1}{8}$ in.

Wheeling and Raising Machines (Fig. 5)

These machines are used for removing dents, creases and buckles from sheet-metal work and forming to shape curved panels.

The machines have a large frame and forming rolls are mounted on the front opening on suitable forks, and the rolls may be turned through any angle. There are, of course, different shaped rolls for different work. The work is fed to the rolls by hand, and skill is required for the operations.

Definitions of sizes of numbers are usually by gap depths, common being 19, 30 and 42 inches, for gauges to 14 s.w.g.

Metal Spinning Lathes (Fig. 4)

Metal spinning is the formation of sheet-metal circular or oval parts by pressure application to the sheet metal while this is rotating at fairly high speed.

The metal to be spun is gripped between the face of a chuck of the correct shape and a held up plate face, with the portion to be spun projecting and spinning tools of various kinds are applied to force the unsupported metal to the required shape. The operation is both highly skilled and comparatively slow, and so this method has been to great extent replaced by mechanical press and tools.

The spinning speed is important and varies very considerably with the metal, its thickness and size. Some average spindle speeds for various metals are:— Mild steel 250 to 650; brass 750 to 1,300; zinc 1,100 r.p.m. Aluminium from about 2,000 r.p.m. at 5 inches diameter to 500 r.p.m. at 20 inches diameter.

Lubricants are used, and those in use are very similar to those used in presswork, *i.e.* tallow, vaseline, graphite, lard oil, etc.

Spinning lathes are defined mostly on the centre height, with sometimes references to bed lengths, if these are important.

SHEET METAL DATA SHEET 6

Sheet Metal Rolling Machines — 2 (Cont.)

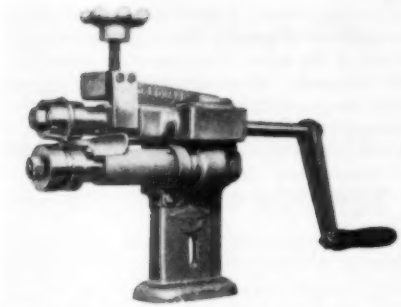


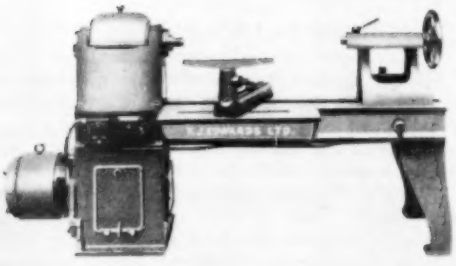
Fig. 1 (above).—Standard-type hand swaging machine

Fig. 2 (right).—Jenny or burring machine

Fig. 3 (left).—Power swaging machine

Fig. 4 (below, left).—Spinning lathe

Fig. 5 (below).—Wheeling and raising machine



INSTITUTE OF SHEET METAL ENGINEERING

Report of Fifteenth Annual General Meeting

THE Fifteenth Annual General Meeting of the Institute was held at the Cafe Royal, Regent Street, London, on May 4. The Chairman of Council, Mr. F. B. Hooper, presided. Following the formal adoption of the Minutes of the previous meeting and the Accounts for the year ending December 31, 1959, the Chairman presented the report of Council on the activities and progress of the Institute during the past year. The year had been notable for three major technical events. The first of these had been the Symposium on "Applications of Sheet and Strip Metals in Buildings," organized with the co-operation of the Institution of Structural Engineers, which had evoked considerable interest and discussion. In June the Institute had collaborated with the Department of Engineering of the University of Sheffield in staging a Seminar on "Practical and Theoretical Aspects of Cold Deformation of Metals." The proceedings at this meeting had been most instructive and progressive and it was planned to hold further courses of a similar nature on future occasions. The year's programme had culminated in the Annual Conference at which a programme of excellent technical papers had been effectively discussed by over 250 members. The Exhibition, which had been staged in conjunction with the Conference was generally adjudged as having been better and more informative than ever.

The Branches continued to do very valuable work and attendance at all local meetings had been at a gratifyingly high level throughout the session. During the year a Committee had been set up in Sheffield to cater for the needs of Institute members in that area and it was intended that meetings of particular interest to Sheffield industry should be held in that City from time to time.

Urgent Need for More Research

In referring to the progress made by the Deep Drawing Research Group of the Institute, the Chairman drew attention to the unsatisfactory position in the U.K. with regard to research into sheet metal working subjects. Sheet metal entered widely into all industrial and domestic fields and was one of the most effective and versatile materials of construction available. Nevertheless its efficient use did present technical problems and it was the whole purpose of the Institute and of its various Groups and Committees to contribute towards the solution of these problems in the interests of the whole industry. While the value of the work being done by the Institute was appreciated and supported by most of the large users of sheet metal, there was a very great number of smaller firms who needed to be convinced of the value of co-operative investigation and research. International technological competition was growing keener all the time and the economic survival of the industry, particularly in relation to the export market, was closely linked with the development and exploitation of ever more efficient ways of fabricating components from sheet metal.

In closing his report the Chairman paid a very warm tribute to all those whose honorary services as members of Council and of the many committees of the Institute had been made so readily and effectively available and without whose sustained interest the work of the Institute could not continue.

Election of Council Members

The Hon. Secretary reported to the Meeting that the following four members of Council had retired and being eligible, had offered themselves for re-election. Mr. H. A. Chambers, Rockwell Machine Tool Co. Ltd.; Mr. T. W. Elkington, Peter Brasshouse Ltd.; Mr. C. E. Hedin, Hedin Ltd.; Mr. R. Kirchner, Arnott and Harrison Ltd. In the absence of any further nominations the above were re-elected to Council for a further term.

Institute Luncheon

The Annual General Meeting was followed by an Institute Luncheon at which the principal guest was Sir William Robson-Brown, Member of Parliament for the Esher Division. Sir William, who has had a life-long association with the steel industry and is an authority on management and labour relations in the industry, addressed the members in a most stimulating manner and drew their attention to the very real need of ensuring that the country's technology was maintained at the highest possible level and that plant and equipment which was inefficient and out-dated was replaced at every opportunity.

Honour for I.S.M.E. President

The President of the Institute, Mr. John Ryan, C.B.E., M.C., has been awarded the Gold Medal of the International Committee for Scientific Management in recognition of his outstanding work in international management. The award was made on the occasion of the 12th International Congress on Scientific Management in Melbourne last March. This is only the ninth occasion on which the medal has been awarded since 1927, and Mr. Ryan is only the second British recipient.

SHEET METAL NEWS

FEATURING EVENTS AND PERSONALITIES IN THE INDUSTRY

INTERNATIONAL INTEREST IN PROTECTION AGAINST CORROSION

A RECENT estimate given by Dr. J. C. Hudson of the British Iron and Steel Research Association of the costs of protection against corrosion incurred in Great Britain in painting steel, galvanizing, tinning and other processes such as phosphating, was £200 million a year and the overall figure for both protection and deterioration has been estimated at £600 million. This is a matter which has attracted a great deal of interest and has led to the formation of societies and technical societies and groups with the object of investigating these special problems.

The British Association of Corrosion Engineers was formed last year to promote the dissemination of technical information on corrosion matters, to develop the free information among members and to promote such educational and other facilities as may be required for the establishment of corrosion engineering as a recognized profession. Individual membership (two guineas) is open to everyone interested and associated with corrosion engineering. The address of the Hon. Secretary is 97, Old Brompton Road, S.W.7. The Association has been elected a member of the European Federation of Corrosion, which is a non-profit-making union with the object to promote European co-operation in the field of research on corrosion and methods of combatting it. Membership is restricted to non-profit-making technical and scientific societies connected with the field of corrosion or the protection of materials. The Federation seeks to achieve its objects by convening joint European meetings for the discussion of subjects of general interest, by convening meetings of working parties for the discussion of specific problems, by the creation of working groups for investigating special problems and by other means. The General Secretariat of the Federation is managed jointly by the DECHEMA in Frankfurt a.M. and the Société de Chimie Industrielle in Paris.

The Corrosion Group of the Society of Chemical Industry which held its annual general meeting on April 21 has reported that its membership continues to grow and is now about 570. A successful two-day Symposium on Corrosion Problems of the Petroleum Industry was held jointly with the Chemical Engineering Group and the Institute of Petroleum. Eleven other meetings were held during the year and most of the lecturers have given up-to-date accounts of research with which they are intimately connected and the practical applications of the results. Subjects have included fretting corrosion, some problems arising in the development of nuclear power, the mechanism of inhibition in neutral solution, the selection of stainless steels for chemical plant and the long term investigations of the British Iron and Steel Research Association.

The First International Congress on Metallic Corrosion is to be held in London, April 10 to 15, 1961, and the Scientific Committee of the Congress has invited titles and synopses of papers for presentation at the Congress at an early date. The scientific programme of the conference includes four plenary lectures by distinguished corrosion workers from France, Great Britain, U.S.A., and U.S.S.R., and the committee aims to secure papers from laboratories throughout the world. The secretary of the Scientific Committee is Mr. Hector Campbell of the British Non-Ferrous Metals Research Association, Euston Street, London, N.W.1.

IRON AND STEEL INSTITUTE

Annual Dinner

The annual dinner of the Iron and Steel Institute was held at Grosvenor House, Park Lane, London, W.1, on Wednesday, May 4, when over 1,700 members and guests attended what has become the largest dinner to be held in London. The president, Mr. W. F. Cartwright, D.L., J.P., assistant managing director and general manager of the Steel Company of Wales Ltd., took the chair, and it was interesting to note that for the first time a lady graced the top table; she was the president's sister, Dr. Mary Cartwright, F.R.S., Mistress of Girton College, Cambridge.

Proposing the toast of "The Iron and Steel Institute and the Industry," the Rt. Hon. Richard Wood, P.C., M.P. (Minister of Power) said that the industry was breaking records month after month and its future was assured. He also referred to the importance of tonnage oxygen to the future of the industry, and commented that finance for development was greater than ever before.

The Minister of Power, he said, had a large stake in the industry, which he felt sure, would always rise to the challenge of not only to-day's problems but those of the future.

Replying to the toast, the president said that he considered himself lucky to be president in such a hopeful year, and reviewed some of the developments that, he said, would in the future, make steelworks not only cleaner but more efficient. He also emphasized the importance of the computor for the future of steel production.

Mr. I. F. L. Elliot, hon. vice-president of the Institute, proposed the toast of "The Guests" and particularly welcomed Dr. Mary Cartwright and visitors from overseas, in particular Dr. Schenck; Sir Cyril Musgrave, chairman of the Iron and Steel Board, replied.

SCIAKY WELDING MOVES ON TO AUSTRALIA

SCIAKY ELECTRIC WELDING MACHINES LTD., Falmouth Road, Slough, in association with Pye Industries Ltd., announce the formation of an Australian company called Sciaky Australia (Pty.) Ltd., to manufacture, install and service resistance-welding equipment for the Australasian Continent. The new company will also have facilities for spares and service for the hundreds of Sciaky machines already in use there. The Sciaky group of companies has factories at Slough, Paris, Chicago and Los Angeles, and has distributors and service depots on every continent.

A spacious new factory has been under construction at Fairfield, New South Wales, for the new Company which was expected to be in production by the end of May. Directors of Sciaky Australia (Pty.) Ltd. include R. W. Ayers (U.K.) and David Sciaky (U.S.A.).

It is just 25 years since Sciaky Electric Welding Machines Ltd. was registered as a company and commenced production of resistance welding machines in Slough using techniques developed by the Sciaky French and American organizations —25 years in which the rapid and progressive growth of Sciaky resistance welding in all its forms—spot, seam, projection and flash butt have provided a considerable contribution to the economical manufacture of many of the popular products to be found in massive quantity production throughout the world to-day. A recent advance is the Sciaky patented "Three-Phase" balanced load frequency conversion resistance welding system.

Productivity has always been the great attraction in the use of resistance welding and in recent years Sciaky have built many completely automatic multi-welders and entire production lines for British industry. Machines with a total weight of 100 tons and 95 ft. in length have recently been completed at the Slough factory. They are capable of assembling and welding a complete car floor, gearbox tunnel and seat reinforcement assembly at production rates of 120 per hour (one million spots per day)—a tremendous step from the small spot welder of 25 years ago.

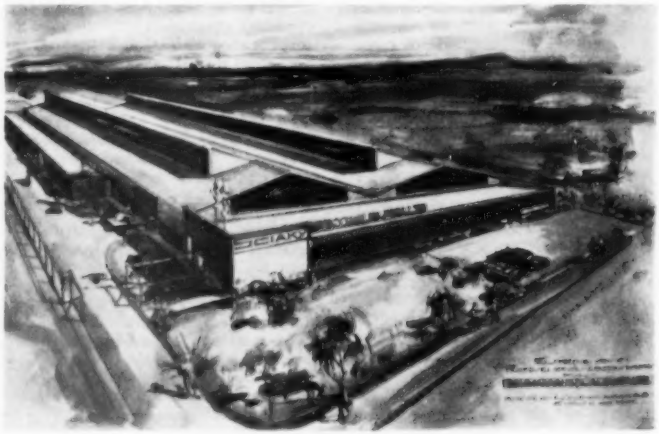
Parallel to the development of the machines have been the advances made in electronic control systems which have gradually decreased the number of operators and skill requirement. An entirely separate division exists at Slough to further investigate design and development in this field.

The extension of the Slough company's activities come as a direct result of a personal survey of Australian industry by Mr. R. W. Ayers, Sciaky's managing director, who has for some years shown interest in the rapidly expanding industry in that country. The modern factory under construction is being erected at Fairfield, a pleasant Sydney suburb where full design and manufacturing facilities for all types of Resistance Welding Machines will be available.

Authority on Resistance Welding

Mr. R. W. Ayers, who is a leading authority on resistance welding and who has helped to promote the use of resistance welding in British and Commonwealth industry, says that the opening of this new plant in Australia is the first move of a big drive in Sciaky's 25th-year anniversary programme to extend and improve its world-wide services and manufacturing facilities.

Artist's impression of New Sciaky Factory



A.E.I. SECURE ½-MILLION OXYGEN PLANT ORDER

ORDERS to the value of nearly £500,000 have been placed with Associated Electrical Industries Ltd., Heavy Plant Division, by British Oxygen Engineering Ltd. for centrifugal air compressors and driving motors.

The machines are for use in various tonnage oxygen plants which are to be constructed at four different sites in this country. Modern developments have greatly increased the need for pure oxygen in many new industrial processes. One of the latest advances in the techniques of steel-making is to use oxygen, instead of air, in various oxidization processes, thereby improving efficiency and increasing steel output. Tonnage plants are also required by the gas-making industry in the new high-pressure gasification stations which are now being constructed.

The compressors supply air to the oxygen plant where it is cooled, liquefied, and separated in a distillation column in oxygen and nitrogen.

Six centrifugal compressors have been ordered, each being rated at about 20,000 cu. ft. of free air per min. with a discharge pressure of approximately 75 lb. per sq. in. gauge. These will be driven through

(*Continued in page* 469)

Oxygen Plant Order

(*Continued from page* 468)

speed-increasing gears by 4-pole, 11-kV synchronous motors.

In addition to these six sets, six 11-kV synchronous induction motors are included in the orders for driving high-pressure reciprocating compressors, also used in the oxygen-making plant.

The centrifugal compressors, gears, and high-speed and low-speed motors will all be manufactured, assembled, and tested by Associated Electrical Industries Ltd., Heavy Plant Division, at Rugby.

TUBE INVESTMENTS ACQUIRE FORDS (FINSBURY) LTD.

TUBE Investments Ltd. announces that it has acquired the whole share capital of Fords (Finsbury) Ltd. of Bedford.

The advanced precision engineering products of this company, particularly in the field of high-speed equipment for capping bottles and forming other aluminium closures, provide close ties between the engineering and aluminium interests of TI and Fords (Finsbury) Ltd.

Mr. R. E. Ford will continue as chairman of the board of the company and its other directors will continue in their present appointments.

DEXION HELPS AT AGADIR

NEARLY 70,000 feet of galvanized Dexion slotted angle were sent to Agadir by the War on Want organization which is an independent body sponsoring relief projects overseas.

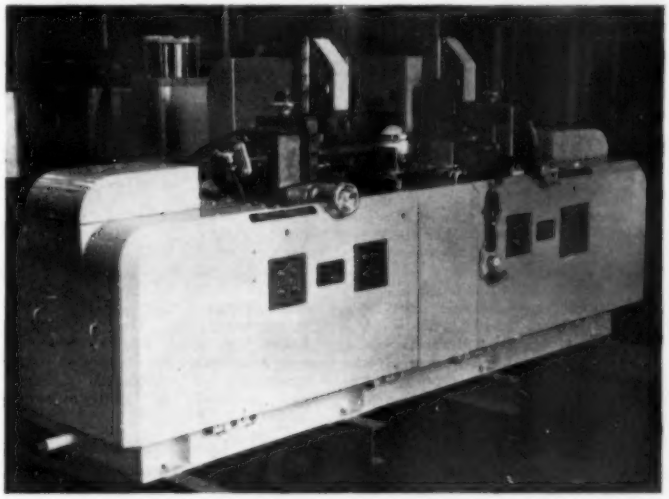
The cost of transportation was met by the Dexion Group who also offered to fly a technical adviser to Agadir, free of charge.

Dexion has been used for reconstruction after several earthquake and storm disasters in different parts of the world. Because of its basic simplicity it can be used by unskilled people on the spot, leaving skilled relief workers to other tasks. In relief work Dexion is particularly suited for the construction of frameworks for housing or temporary shelters, roof trusses, and foot bridges and because of its slot pattern is more resistant to earthquake tremors than many conventional materials.

WELDING MOTOR CAR AXLES

THE illustration below shows the British Federal Welder and Machine Co.'s Dual 150-kVA flash-butt welding machine, as supplied to the British Motor Corporation for welding of automobile axle castings. A large number of these machines are now in use by many leading British automobile manufacturers and are employed both for welding axle tubes to the banjo section and stub axles to banjo tubes.

The machines are fully automatic in operation and are provided with independently adjustable tools to facilitate accurate alignment. The makers are the British Federal Welder and Machine Co. Ltd., Castle Mill Works, Dudley, Worcs.



COMMONWEALTH TRAINING WEEK TO BE ARRANGED IN 1961

All Forms of Training for Employment Covered

AT a meeting held in Buckingham Palace in May, 1959, it was agreed to hold a Commonwealth Technical Training Week throughout the Commonwealth in 1961 with the object of stimulating awareness of the responsibility of the community towards young people entering employment, and to stress the importance of schemes of induction and training. The meeting was attended by High Commissioners, members of Her Majesty's Government and representatives of the local authorities, and various national and industrial organizations.

The City and Guilds of London Institute undertook central administrative responsibility for the week and in his capacity as President of the City and Guilds of London Institute, the Duke of Edinburgh has approved the decision that in the United Kingdom the date of the week will be from Monday, May 29 to Sunday, June 4, 1961, inclusive; it is hoped that it will be possible to hold the week in other parts of the Commonwealth and that, as far as possible, the same dates will be chosen.

The week is intended to cover all forms of training for employment, including apprenticeship, operative training, and training for commerce, agriculture, the professions, etc., and a booklet is in preparation listing activities which might be arranged. The Institute has written to all county, city, borough and urban and rural district councils in England and to local authorities in Scotland and Northern Ireland, informing them of the date selected and asking them to consider whether they wish to take part in the Week and if so, to decide among themselves the most suitable areas for the purpose and the best way of organizing the week.

AMERICAN SOCIETY FOR TESTING MATERIALS HOLD NEAR RECORD COMMITTEE WEEK

DURING the first week of February over 1,400 engineers and scientists —the second largest attendance in the history of ASTM Committee Week—met at the Hotel Sherman in Chicago to deal with the year's work in anticipation of the June Annual Meeting of the Society. In five days, 35 of the Society's technical committees held 351 meetings of sub-committees and working groups whose task is to keep ASTM standards up-to-date and useful in a fast-changing world. The activity of the Society is reflected in its membership which passed the 10,000 mark last October and in recognition of this event, certificates were given at the Committee Week Dinner to the 10,000th member, Mr. R. J. McCallin of the Medusa Portland Cement Co., Mr. A. J. Loepsinger, Director of Research, Grinnell Corp. as the 1,000th member and to Mr. H. Allen, U.S. Bureau of Roads, as the 5,000th member.

A high point of the Committee Week was a Panel Discussion on Appearance of Aluminium Surfaces sponsored jointly by a task group of the Committee on Appearance and the Committee on Electro-deposited Coatings. The following three discussions were heard, with R. V. Paulson serving as moderator:

"Appearance Measurement from the Management Viewpoint" by R. T. Myer, Kaiser Aluminium and Chemical Corporation.

"Gloss Measurement of Transparent and Semi-transparent Films on Aluminium" by W. C. Cochran, Research Dept., Aluminium Co. of America.

"Gloss Measurements" by E. Barkman, Research Dept., Reynolds Metal Co.

The speakers discussed the various problems resulting from the need for matching colour and gloss of anodized silicon-aluminium alloys in such industries as architecture, automotive and appliance industries; the excellent attendance, as well as the oral discussion, indicated a broad and general interest in the subject.

The main technical committees which met in Chicago and are of interest to readers are as follows:

A-5 Corrosion of Iron and Steel.

A-10 Iron-Chromium, Iron-Chromium-Nickel and Related Alloys.

B-2 Non-Ferrous Metals and Alloys.

B-3 Corrosion of Non-Ferrous Metals and Alloys.

B-7 Light Metals and Alloys, Cast and Wrought.

B-8 Electro-deposited Metallic Coatings.

E-1 Methods of Testing.

The Committee on Corrosion of Iron and Steel has completed a new specification covering zinc-coated iron and steel sheets for culverts and underdrains and work is continuing on specifications for aluminium-coated iron and steel sheets. A new atmospheric exposure test programme covering galvanized and aluminium-coated steel corrugated roofing sheets will be made this spring at five exposure sites throughout the United States. Laboratory work was reported on test methods for porosity and uniformity of aluminium coatings and methods of analysis were initiated.

Committee A-10 approved the addition of low-carbon grades of stainless-steel castings to Specification A 296. Grade CF-3 will cover the low-carbon chromium-nickel composition and grade CF-3M the low-carbon chromium-nickel-molybdenum steel. Other new grades will also be added to the specification including CG-8M, HD, HL, and HN.

The Committee on Light Metals and Alloys have approved the identification of wrought aluminium and aluminium alloys by the Aluminium Association designations instead of each alloy being identified by both the ASTM and the Aluminium Association systems as hitherto. The ASTM system will continue to be used for cast aluminium alloys and cast and wrought magnesium alloys.

The new title of Committee B-8 is "Electrodeposited Metallic Coatings and Related Finishes" and its scope will include anodized and functional coatings. A recommended practice has been drafted for sulphuric-acid anodizing of aluminium for various applications and a proposed specification resubmitted for anodic coatings on aluminium and aluminium alloys. A method of testing the thickness of anodic coatings using the eddy-current test is being developed.

Transparencies of the 22 grain sizes now included in the Plate I of ASTM Method E 112 for estimating the Average Grain Size of Metals will be offered for sale by ASTM Headquarters since it is felt that such transparencies would serve the metal industry as a useful tool. Plate I covers untwinned grains with a flat etch and is particularly applicable to aluminium, magnesium, zinc, and ferritic iron and steel at a magnification of 100×, but the transparent simple grain network could also be used to estimate grain size of other metals more easily than transparencies of the standard twinned and contrast-etched grain sizes in the other plates of Method 112.

CONFERENCE ON HEAT TREATMENT

A CONFERENCE on heat treatment practice, organized by the British Iron and Steel Research Association, will be held at Harrogate on July 5 and 6 next.

The main aspect of the subject to be considered will be "carburizing," the various papers ranging over the theory and practice of carburizing and the properties of carburized steels.

Full organizational details and registration forms are available from the Technical Secretary, Metallurgy (General) Division, BISRA, 11, Park Lane, London, W.1.

LEIGE FAIR: FOUR CONFERENCES

THIS year's 12th Liège International Fair, which will be held from June 2 to 16, promises to be the most active in its history.

During its run the International Institute of Welding will hold its Congress in Liège; in addition there will be other conferences, on New Building Techniques, Spectroscopy, and Greater Hygiene and Safety at Work.

With the rapprochement between the Common Market countries and the Outer Seven a top priority for 1960, British firms are invited to present their goods and services at one of Europe's foremost technical exhibition, in the heart of the Common Market area. The Exhibition's U.K. representative is R. C. Liebman, 178, Fleet Street, London. E.C.4.

HEAD WRIGHTSON SECURE FRENCH CONTRACT

THE Head Wrightson Machine Co. Ltd., a subsidiary of Head Wrightson and Co. Ltd., is manufacturing 23 copper conductor rolls, valued at £53,000 for the French firm Ets. Dujardin and Cie. These rolls, 24 in. in diameter with a face width of 46 in., will form part of an electrolytic tinning line to be supplied to the Phenix Steelworks in Belgium and built under the licence from the Aetna-Standard Division of Blaw Knox.

Since solid drawn copper tubing of 24 in. diameter could not be obtained, it was necessary to find a means by which the roll barrel could be formed by bending copper plate of 1 in. thickness. Head Wrightson were able, after considerable research, to develop a technique for the production of a homogeneous longitudinal weld along these shells. Having produced the shells, the rolls were built up by inserting phosphor-bronze shafts to which supporting webs had been welded.

By means of these rolls the plating current of 60,000 amp. at 20 v. is transferred from a heavy busbar system into the strip as it passes into the cleaning, pickling and plating tanks. In the future the plating current will be increased to 120,000 amp at 20 v. with the addition of more tanks.

Head Wrightson has supplied similar copper rolls to the Steel Co. of Wales for their electrolytic tinning line at Velindre.

Machining a copper conductor roll at Head Wrightson's Works

MORE OXYGEN FOR EAST AFRICA

OXYGEN production capacity in Kenya is to be substantially increased.

The British Oxygen Co. Ltd., announce that additional plant is to be supplied to both the Kampala and Nairobi works of East African Oxygen, Ltd., a member of the British Oxygen Group. A 1,000-cu. ft. capacity static oxygen plant is on order for Kampala, while a 1,000-cu. ft. air separation unit, an alumina drier battery and B.O.C. 110 expansion engine are being supplied to Nairobi.

The new plant for Nairobi is due in production in June, 1961. The new plant for Kampala, which will double the present production capacity, is expected to enter service in September, 1961.

U.S.A. INDUSTRIAL DEVELOPMENT IN THE U.K.

FOR several years now the United Kingdom has been one of the places most favoured by the United States manufacturers seeking to expand the field of their operations. During the period 1950 and 1959 almost 800 proposals from United States businessmen to manufacture in this country received the necessary government assent and by the end of 1958 they had invested over 2,000 million dollars in the United Kingdom.

Hitherto, sources of information available in the United States about opportunities for setting up manufacturing enterprises in the United Kingdom have been the Commercial Section of the Embassy and Consular posts throughout the United States, as well as special missions from time to time, and representatives of some Regional Development Associations in New York. The Board of Trade has now decided to set up a special office in New York to combine these activities in a completely integrated unit in co-operation with the Northern Ireland Government who already maintain a similar office for its own purpose in New York.

The address of the new office will be :—

United Kingdom Industrial Development Office,
British Consulate-General,
99, Park Avenue,
New York, 16.

It will be headed by Mr. A. Currall, an assistant secretary of the Board of Trade, seconded to the Foreign Service for this purpose.

COURSES IN MANAGEMENT

SIR DAVID ECCLES, Minister of Education, has outlined, in a circular to local education authorities, a scheme for a new Diploma in management studies and two new National Certificates in business studies. The Diploma is designed to provide a more advanced course suitable for men and women who are already professionally qualified. It will be awarded, not before the age of 26, to students who have completed a course of study which may be full-time, up to one year or part-time, taking three years to complete. Before entering on the course, students will normally be required to hold a degree, a diploma in technology or equivalent qualifications, but arrangements will be made to enable older students without these qualifications, but with substantial practical experience, to take the course.

It is hoped that the scheme will fulfil the need for advanced management education and that industry will sponsor students for the courses.

ELECTRO-POLISHING HELPS TO PRODUCE STAINLESS-STEEL ANCHORS

BY utilizing the Electropol Process (main United Kingdom processing plant, Electropol Processing, Ltd., Trading Estate, Farnham, Surrey) it has been possible to produce solid stainless-steel anchors in commercial quantities at prices well within the range of the yachtman's pocket and comparable with those of conventional galvanized steel anchors, even though stainless steel is over ten times the price of ordinary steel.

These "Digger" Anchors are manufactured by Dell Quay Yacht Yard Ltd., Chichester, and owing to the high strength of the stainless alloys it has been possible to produce a light-weight anchor which has a high fluke area, thus yielding holding powers far in excess of those of the conventional anchor of much greater weight. The special shape of the crown contributes to the fluke area and ensures that the anchor automatically adjusts itself to lie correctly on and in the ground. The head is held up and the fluke points driven into the ground, ensuring reliability of action. Although fast and tenacious while buried, when hauled short overhead the anchors come out cleanly. In cases of emergency the crown is fitted with a tripping attachment; a heave on this brings the "Digger" safely home. Its light weight enables it to be easily swung clear of the top sides.

Why Electro-Polished ?

The corrosion resistance of stainless steel is well known; but it is essential that the steel's surface be as smooth as possible. Maximum corrosion resistance depends on the quality of the polish and freedom from inclusions.

If the anchor had had to be finished by the normal mechanical polishing methods, which are time and labour consuming, besides being otherwise costly, its selling price would have been prohibitive. By utilizing the electropolishing method a far smoother surface has been produced in every part of the fabricated anchor than would have been possible by mechanical methods, while some parts, most likely as seats of corrosion, could not possibly have been polished. This smoother, highly lustrous, greater corrosion resisting surface is also so economically created that the "Digger" anchors are sold at a competitive price.

World's first commercially produced stainless-steel anchor

DAVY-UNITED FORM NEW STEEL PROCESS DIVISION

DAVY AND UNITED ENGINEERING CO., LTD. announce that they have formed a Steel Processes Division to absorb the personnel and carry on the work previously undertaken by Davy British Oxygen Ltd. Davy British Oxygen was established over three years ago jointly by Davy-United and British Oxygen to investigate the various kinds of pneumatic steelmaking processes and to carry out the basic engineering studies necessary for the design of complete oxygen steelmaking plants. This arrangement brought together the plant designing resources of Davy-United and the techniques in the use of oxygen which the British Oxygen Co. has developed.

The rapid expansion of oxygen steelmaking throughout the world has necessitated an expansion of activity by the joint company and the two companies have agreed that the execution of prospective contracts for oxygen steel melting shops should be handled by Davy-United in view of their experience of large scale contracts involving heavy steelworks plant. Accordingly the Steel Processes Division has been formed although Davy British Oxygen Ltd. will remain in existence and act as the focal point for future collaboration in this field.

Davy-United's Steel Processes Division is at Suffolk House, Suffolk Road, Sheffield 2, and is staffed and equipped to provide metallurgical, technical and economic surveys against any projected steelmaking development, design services for oxy-steel equipment, and the engineering and supply of oxygen steelmaking plant up to complete melting shops.

GOVERNMENT TRAINING CENTRES

THE Minister of Labour, Mr. Edward Heath, has announced that he proposes to set up a small number of classes in Government Training Centres to provide first year apprenticeship training for boys accepted as apprentices by firms and preferably from firms which have hitherto found it impracticable to undertake apprentice training or to increase their present number of apprentices. No charge will be made for the training provided, but employers taking part in the scheme will be required to give an undertaking to pay the wages of apprentices during the year and to continue the boys' training afterwards under the normal industrial arrangements. The usual provision for day release will apply during the year. The scheme has been approved as a whole by the British Employers' Confederation and the Trades Union Congress, and the establishment of classes in engineering has been agreed by employers and trade unions in that industry.

The first training places will be available this summer at eight Government Training Centres—Aintree, Birmingham, Bristol, Cardiff, Hillington, Leeds, Letchworth and Long Eaton. Further classes will be added at some of these centres and at others, probably Enfield, Leicester, Perivale, Slough and Waddon.

Training will cover, on a systematic basis, a syllabus similar to that covered during the first year by firms with good apprenticeship training arrangements. Detailed syllabuses have been supplied to the engineering and construction industries.

ANGLO–FRENCH TECHNICAL CO-OPERATION

COMPLETE automatic paint spraying installations ranging from the classic dipping or spraying methods to advanced electro-static and airless high-pressure precision systems are now available to British manufacturers through E. G. Irwin and Partners Ltd.

This is the result of the association formed between Irwin and Partners, design development and consulting engineers of London and Société d'Equipment Technique Rationnel Pour l'Industrie (S.E.T.R.I.) of Paris.

S.E.T.R.I. have combined within a single organization the fields of industrial chemistry, mechanical, electrical and heating and ventilating engineering to enable them to specialize in the design and building of automatic plant for metal surface preparation. They have already established a considerable reputation throughout the Continent where they have installed plants for Renault and Citroen as well as many other domestic industries.

Irwin and Partners have a qualified staff of more than 300 to meet a client's needs in any of the fields of civil, mechanical, electrical, structural, industrial plant, product and production engineering.

PURCHASING OFFICERS ASSOCIATION MINIBITION

THE 1960 "Minibition" organized by the Purchasing Officers Association will be held in The Spa, Scarborough from September 29 to October 1.

This exhibition, which as its name implies, is a miniature one in which the stands are all of standard construction with a platform size of 3 ft. by 5 ft., is planned as an educational feature at the Association's National Conference. It gives manufacturers an opportunity to show their products to buyers for industrial concerns and public undertakings. The stand hire charge is £25 and as usual there will be a competition for the best displays, divided into two classes, educational and display.

Further details may be obtained from The Secretary, Purchasing Officers Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4.

CHANGES OF ADDRESS

THE new address of Precision Components (Barnet) Ltd. is Kabi Works, Cranborne Road, Potters Bar, Middlesex, Telephone Number: Potters Bar 3444.

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UDDEHOLM LTD. have indicated that their London office is now at 124, Victoria Street, London, S.W.1, Telephone Number VICtoria 6780 and 5711. Their Head Office remains at Crown Works, Northwood Street, Birmingham 3, CENtral 8971, and the Scottish service depot at Alangrange Lodge, Kenilworth Road, Bridge of Allan, Stirlingshire, Telephone 2289.

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ANDREW FRASER AND CO. LTD., the hydraulic pump and valve manufacturers, have a new address: 64/65, Vincent Square, London, S.W.1. Their telephone number remains VICtoria 6736.

This company was previously situated at 29, Buckingham Gate, London, S.W.1.

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THE Head Office, Registered Office and Transfer Office of Frederick Braby and Co. Ltd. is now Braby House, Smithfield Street, London, E.C.1.

INSTITUTE OF WELDING

London Branches Dinner

THE annual dinner of the North and South London Branches of the Institute of Welding was held at the Connaught Rooms, London, W.C.2, on Thursday, April 21, with R. W. Ayers, president of the North London Branch, in the chair.

A record number of members and friends attended what can only be called a most enjoyable and successful evening. The toast of "The Institute of Welding and the London Branches" was proposed by Mr. A. A. Shenfield, economic director of the Federation of British Industries, to which the president of the Institute, Mr. E. Seymour Semper, M.I.Mech.E., F.R.S.A., replied.

The toast of "The Guests" was proposed by Mr. N. L. G. Lingwood; Mr. J. Strong, M.A. (past-president) replied.

Sixth Castner Memorial Lecture

THE Society of Chemical Industry announce that Dr. W. J. Kroll of Corvallis, Oregon has been appointed the 6th Castner Memorial Lecturer and will deliver his lecture entitled "The Fusion Electrolysis of Titanium" in Glasgow on Friday, October 7, 1960.

NEW COMPANIES

"Ltd." is understood, also "Private Co." Figures = Capital, Names = Directors, all unless otherwise indicated.

PLANT AND PARTS, 18, Bentinck Street, W.1. March 7. £100. *To carry on bus. of engrs., founders, etc. Samuel T. Horsfield, Noel T. Jenkinson, Harold V. Wardle.*

D. S. TURNER. March 9. £20,000. *To carry on the bus. of smelters and casters of aluminium and other ferrous and non-ferrous metals, etc. Directors not named.*

WESTS-LOYNE, Drewitt Street, Miles Platting, Manchester. March 11. £25,000. *To undertake all operations in connection with the application of linings and coatings of anti-corrodable and anti-corrosive substances, etc. Directors not named.*

COLCHESTER LATHE (DISTRIBUTORS). March 22. £100. *To carry on the bus. of merchants, sellers and suppliers of machine tools and anti-friction and other bearings, and manufacturers of lathes, etc. Directors not named.*

H. SAMSON (BOLTON), Morris Fold, Thwaites Street, Bolton. March 23. £5,000. *To take over bus. of sheet-metal worker and panel beater carried on at Bolton by Harry Samson, etc. Harry Samson, Lily Samson, Percival R. Copper.*

MECVET SERVICES, Warwick House, Usk, Mon. March 23. £5,000. *To carry on the bus. of manufacturers of and dealers in machine tools, press tools, etc. Richard J. Blench, Herbert Blench.*

BLOOMER AND CLARKE, Hurst Lane, Tipton, Staffs. March 24. £1,000. *To take over bus. of diesinkers, toolmakers and engineers carried on as Bloomer and Clarke at Tipton, etc. Albert W. Clarke and Mrs. Beatrice M. Clarke.*

W. H. PYWELL, Birkdale, Shell Beach Road, Canvey Island. March 29. £100. *To carry on bus. of precision engineers and metal workers, etc. Wm. H. Pywell and Maude Riddell.*

STALEY-PORTLAND, 18, Portland Place, Stalybridge, Ches. March 30. £1,000. *Robert S. Beckett, Alan Pickering, Denis J. Turner.*

From the Register compiled by Jordan & Sons Ltd. 16, Chancery Lane, London, W.C.2.

APPOINTMENTS and STAFF CHANGES

Mr. Jonathan Backhouse, a managing director of J. Henry Schroder and Co. Ltd., Mr. Patrick C. Hall, chairman of Hall Engineering (Holdings) Ltd. and Mr. G. J. W. Turner, M.C., T.D., J.P., chairman of Wrights' Ropes Ltd., have accepted invitations to join the board of **The Lancashire Steel Corporation Ltd.**

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The Fairey Company Ltd. have appointed Mr. L. R. E. Appleton as managing director of **Fairey Engineering Ltd.** and Mr. P. J. Duncton (who is already a director of Fairey Engineering) as general manager, Heston. The Heston, Middlesex, factory is now the new head office of Fairey Engineering Ltd. Mr. H. G. Gregory remains director and general manager of Fairey Engineering's Stockport factory.

These new appointments reflect the changes in organization brought about by the sale to Westland Aircraft last month of Fairey Aviation Ltd., Fairey's U.K. aviation subsidiary. The Fairey Company now has 10 subsidiary companies of which Fairey Engineering is one.

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Mr. George Taylor has joined the London staff of **Moon Brothers Ltd.,** the steel drum and tin box machinery manufacturers of Birkenhead. He will be responsible for sales in the Southern Counties and export sales from the company's London Office, where he will work with Mr. E. C. Gladwin.

Prior to taking up his new appointment Mr. Taylor was sales manager responsible for marketing in the U.K. and overseas for the can machinery sales division of E. W. Bliss (England) Ltd., of Derby. He had been with that firm for over 23 years.

Mr. Taylor is the son of the late Mr. George Taylor, who was a well-known figure in the tin-box industry for many years and was a regular contributor to SHEET METAL INDUSTRIES. Mr. Taylor, 40, is married with one son and served in the Army for over six years, including service in India, where he was a Major attached to the Staff of the Chief Engineer, Southern Army Command.

Mr. GEORGE TAYLOR

(Moon Bros.)

Mr. J. Lamont has joined **Escol Products Ltd.,** on the frit production staff. He attended the Paisley Technical College where he obtained a distinction in Higher National Certificate and started training in the laboratories of Carrongrove Papermills; this was followed by five years in the central laboratory of Allied Ironfounders and later with the Imperial Chemical Industries Metals Division, Birmingham.

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Mr. R. D. Pearce, B.Sc. (Hons.), has been appointed a director of **Keeton, Sons and Co. Ltd.,** a member of the Firth Cleveland Group.

Keeton, Sons and Co. Ltd., of Greenland Road, Sheffield, 9, are manufacturers of fabricated-steel machinery for the sheet-metal-working industry. A second division of the company specializes in deep hole boring of steel bars for the chemical, petroleum, aircraft engine and heavy industrial equipment industries.

Mr. C. H. Barden, 34, has been appointed to the technical sales department of **Smith's Aviation Division,** Wembley, Middlesex, from the company's Research and Development organization at Cheltenham. Mr. Barden has a considerable background knowledge of autopilot development which will be of particular value to the company in pursuance of its policy of seeking new markets both at home and overseas.

Mr. Barden joined Smiths in 1954 from Foster Transformers Ltd., and worked at first on a guided weapon control system before transferring to autopilot research.

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Mr. Lawrence Sutton, B.Sc. (Econ.) has been appointed education officer to the **Institution of Works Managers,** 196, Shaftesbury Avenue, London, W.C.2. Mr. Sutton was formerly director of studies at Ashbridge College.

He was educated at Eastbourne College, University College, London, and the London School of Economics, being the Unwin Memorial Prize winner of his year and he started his educational career as Housemaster at Bloxham College, Banbury.

After wartime service with the Royal Engineers he was with the Control Commission for Germany until 1950 and retired to Ashridge College where he became responsible for the inauguration and running of the Management Training Courses and Conferences on specific problems of management and labour relations. As the Institution's Educational Officer he will collaborate with all Technical Colleges running the Institution's two-year Training Course.

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At the annual general meeting of the **British Rubber and Resin Adhesive Manufacturers' Association** held in St. Albans recently the following officers were elected for 1960-1961:—

Chairman: Mr. N. G. Bassett Smith, (Dunlop Rubber Co. Ltd.);
Vice Chairman: Dr. H. Simon, (Evode Ltd.)

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Mr. Ronald H. Braime, chairman and managing director of **T. F. and J. H. Braime Ltd.,** sheet metal pressers, Hunslet, Leeds, has been elected president of the **Leeds Chamber of Commerce**. He joined the family business, which was established in 1890, after graduating from Merton College, Oxford, where he had gone after schooling at Cheltenham College and Leeds Grammar School.

Mr. Ivor A. Bailey has been appointed deputy chairman of **The Mond Nickel Co. Ltd.** and of **Henry Wiggin and Co. Ltd.** and Mr. Edward Vaughan has been appointed director of both companies.

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Mr. H. H. Utley, A.M.I.Mech.E., F.Inst.F., A.I.M., has been appointed managing director of **Davy and United Roll Foundry Ltd.**—a subsidiary of Davy-United Ltd.—its works are at Billingham, Co. Durham. Mr. M. A. Fiennes, previously chairman and managing director, has thus relinquished the managing directorship but remains chairman.

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The Engineering Group of **The General Electric Co. Ltd.,** announces the appointment of Mr. E. W. Molesworth as chief engineer for the London, Southern and Eastern Areas. Mr. Molesworth has completed more than 30 years' service with G.E.C. His predecessor in this position was Mr. C. J. O. Garrard who was recently appointed assistant general manager of the company's Erith Engineering Works.

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Mr. T. J. MacArthur has resigned from the board of **Stewart and Gray Ltd.,** vitreous enamellers of Mitcham, Surrey, and will relinquish his position with that company with effect from June 30.

* * *

George Kent Ltd. announce the appointment to the board of directors of Mr. John F. Willsher, general works manager.

Mr. Willsher, who is married and in his early forties, joined the company in 1947 on his release from the Army with the rank of Captain. Four years later he was appointed production controller and, the following year, production manager. He held the post of instrument division manager from 1955 until early 1959, when he succeeded the late Mr. J. Horridge as general works manager.

Mr. Willsher has a great interest in local management affairs and served on the council of the Luton Management Association for a number of years; he is now a representative member of the British Institute of Management, Local Branch.

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Mr. G. M. Harvey has been appointed development director of **British Oxygen Gases Ltd.** By arrangement, Mr. Harvey will continue as managing director, British Oxygen Wimpey.

Technical adviser to **British Oxygen Engineering Ltd.,** Mr. S. S. Watts retired recently after many years' service. From 1929 to 1959, Mr. Watts was Lecturer in mechanical engineering at the University College, London.

He started his career with B.O.E. as research manager at Edmonton. National demand during the war years placed emphasis on production and he was transferred to this function.

Between 1933 and 1938 Mr. Watts wrote a number of technical books. A number of these are still standard publications.

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Mr. M. L. Jofeh, O.B.E., A.M.I.E.E., manager, Industrial Division, has been elected as an additional director of **Sperry Gyroscope Co. Ltd.**

Mr. Jofeh joined Sperry in 1947 as an equipment engineer, subsequently heading the engineering unit at the company's Stonehouse (Glos.) factory for a number of years.

In February, 1954, he returned to Brentford to take up the position of deputy chief engineer and later chief engineer of the company with responsibility for the design of all new equipment.

His appointment as manager of the newly formed Industrial Division was announced in January, 1959, when the company disclosed its reorganization plans covering the extension of its activities into the field of industrial control systems and instrumentation.

Mr. JOHN F. WILLSHER

(George Kent Ltd.)

Wolf Electric Tools Ltd., London, have just appointed Mr. Klaas van Walraven as sales supervisor for Holland, where for many years, their industrial and domestic portable electric tools have been in popular demand.

Mr. van Walraven already has wide experience and strong trade connexions qualifying him for this position. For several years, he has been responsible for promoting electric tool sales for the well-known firm of Warmond Ltd., Rotterdam, and prior to that, was area representative for another Dutch electric tool importer.

Having completed a few months' intensive training and field experience in England, Mr. van Walraven has now commenced his duties in Holland, and is working closely with the Wolf importers and distributors there.

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British Resin Products Ltd. announce that Mr. G. F. Prescott has been appointed a director of the company.

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Sir Ronald L. Prain, Chairman of the Rhodesian Selection Trust Group of Companies, has relinquished the chairmanship of the management committee of the **Copper Development Association** after ten years in that office.

He has been succeeded by Mr. E. C. Baring, a director of the Anglo-American Corporation of South Africa Ltd., and vice chairman of the Council of the Association of which Sir Ronald will remain as chairman.

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Mr. Lindsay Carstairs, chairman of **Arusha Industries Ltd.** announces the appointment of three executives to new positions on the group headquarters staff.

Mr. A. B. Lidderdale, M.I. Mech.E., M.I.Prod.E., formerly member of the cables group board and deputy to the managing director of Telcon Ltd., and director of Toolpro Ltd., is appointed personal assistant to the chairman.

Mr. L. Ingham, A.M.I.E.E., is appointed group sales manager of Arusha Industries having formerly held the post of assistant general sales manager of Chloride Batteries Ltd.

Mr. A. J. Smith, B.SC., A.M.I.-Mech.E., was until recently general works manager of the Glacier Metal Co. and becomes the group industrial engineer.

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With effect from April 4, all articles manufactured by the Fleming/B.A.O. group of companies which are intended for industrial consumption have been planned to be marketed through one subsidiary known as **Optoshield Ltd.** Mr. C. J. Williams has been appointed general sales manager of the new company and Miss B. P. Park the safety sales manager.

Books for Your Library

The Corrosion and Oxidation of Metals, by Ulick R. Evans, Sc.D., F.R.S., F.I.M., 1960. Edward Arnold (Publishers) Ltd., London. 1094 pp. Price £7 net.

THE author of this book is so well known as a world-wide authority in his own field that it would be an impertinence to attempt to review the work in the normal way. It is really sufficient to announce its publication, and to quote some of the author's own comments in his preface.

He points out that this is a new book, in which he states his personal views on corrosion, with a summary of the experimental work that has influenced him in reaching these views. The opinions of many other investigators have not been neglected as can be seen from the author index, which contains over 3,000 names. It is difficult in fact, to find anyone who has contributed to Dr. Evans' subject in small or large measure whose work has not been given reference in this most comprehensive book.

In the scientific section the author has let the different schools of thought speak for themselves, and liberal references are provided to papers and books expressing views, not necessarily inconsistent with those put forward by him, but approaching the subject from different angles.

In the industrial section it has generally been found possible to summarize the facts established by the observations of competent observers, and references are then given where fuller details can be found.

Twenty-two chapters are in this book, but mention should be made of the appendices of which there are two. The author considers that the engineer of today is taught very little chemistry and therefore the first appendix presents, albeit in condensed form, those principles of chemistry needed for the understanding of corrosion. The second appendix, devoted to physical chemistry, especially electro-chemistry, may, the author considers, make a wider appeal.

It is interesting to note also that the first 18 chapters are almost free from equations (except in footnotes), after which the treatment becomes quantitative.

Altogether this is a monumental work, whose high value to anyone interested in corrosion cannot truly be estimated.

E.L.

The Engineer "Buyers Guide," 1960. "The Engineer," 28, Essex Street, Strand, London, W.C.2. Price 7s. 6d. (plus 1s. 9d. postage).

THIS year's edition of the 'Buyers Guide' takes much the same basic form as previous issues. The main section, 768 pages of it, contains over 34,750 entries arranged under approximately 2,650 classified headings with 1,600 cross references to help the user find what he wants. The addresses and other relevant details of the firms whose entries appear in this section are to be found in a special address section. Similar types of products have been grouped together, for ease of reference, but several specialized sections appear at the end of the main section and include chemical plant, electrical equipment, engines and engine parts, machine tools and accessories and sheet-metal working machinery.

Two other sections, included in this edition, should prove useful in many varied branches of industry, One is an attempt to list the almost continuous round of exhibitions at home and abroad, slowly becoming a feature of modern industrial advertising, and the other is a comprehensive list of U.K. agents for foreign firms.

All round, this is a valuable contribution to the field of reference books, and only one minor criticism comes to mind. For a book of this nature that will obviously be in use every day and will be well thumbed in the course of the next 12 months, a slightly stronger cover and binding is surely not an extravagant possibility.

Industrial Finishing Year Book. 1960. Arrow Press Ltd., 1, Stamford Street, London, S.E.1. Price 15s. (post paid).

THIS book sets out to cover, in a single volume, the whole field of industrial finishing, and this object has been achieved with a great measure of success.

The book is divided into two basic sections ; a technology section and a buyers' guide section. In the technology section, tabular form has again been selected for listing much of the information, since this has been proved in the past to be the most helpful and popular way of presenting data. Besides comprehensive tables listing cleaning solutions, the physical characteristics of electrodeposited coats, the properties and uses of synthetic coatings, the properties of solvents, polishing-wheel grit sizes, metal-colouring treatments, and the physical constants of oils, to name but a few, there are tables referring to faulty deposits from plating baths, and how to correct them, and suggested etching procedures, all immediately practical and handy for the man in a hurry.

The buyers' guide and trade directory contains a classified list of suppliers of finishing materials and equipment, giving addresses and telephone numbers. Another useful feature of the directory is an alphabetical list of trade names and the relevant manufacturers.

The Surface Treatment and Finishing of Aluminium and its Alloys, Second Edition, 1959. By S. Wernick and R. Pinner. Robert Draper Ltd., Teddington. 607 pp. £4 10s.

THIS book is well known as by far the most comprehensive review of the subject and, in view of the wide field covered, it is not surprising that some gaps or inaccuracies occurred in the first edition. It would seem reasonable to expect that a major object of producing a second edition, within three years of the first, would be to correct such omissions and errors and generally to profit from the experience of usage of the book, in addition to bringing it up to date. It is a little disappointing, therefore, to find such revision falling short of one's expectations, but the main disappointment can be avoided by skipping the first chapter.

The first two chapters of the first edition, which formed the introduction to the main subject, have been appropriately combined in one chapter, but the subject matter has not received the desirable improvement. The omission of the brief description of the standard alloys heightens the impression that this introduction lacks logic and balance, is too much concerned with academic details at the expense of broad principles of practical importance and is not up to date. For example, the section on super purity aluminium makes only one mention of this purity and excludes it from the table specially given for this section, although an authoritative review of the metal was recently published (*Metallurgical Reviews*, 1957, **2**, (8)). Again, the information on the corrosion of aluminium-magnesium alloys on pp. 16 and 21

is conflicting and inaccurate. The publications of the Aluminium Industry give much more lucid, accurate, practical information on the range of properties of aluminium and its alloys of interest to anyone concerned with the finishing of them, yet there is reference to only one of such publications and that in the Appendix.

It is quite a relief to proceed to the succeeding chapters, with their wealth of practical information and theoretical background, arranged in the same general pattern as in the first edition. Even here, however, there are some errors and omissions, examples of which may be given in the hope that the authors will consider this aspect more in the next edition. The writer regards nitric acid cleaning, as generally used, to be a means of removing oxide and surface contamination, whereas the selective removal of alloying constituents or revelation of the crystalline structure of the metal, referred to on p. 156, is indicative of excessive treatment. The concentrations given for this acid are far in excess of those generally used for the purpose. More quantitative information might have been given on the opposing effects of the thickness of anodic films, on corrosion resistance and reflectivity respectively, especially in relation to metal composition. Fuller explanations of Figures 75 and 76 would make it less difficult to follow Baumann's and Schenk's theories on the mechanism of film growth in anodizing. Developments in conversion coatings are not adequately covered: for example, there is no mention of the Architectural Alocrom process, or of the ion exchange resin plants developed for the regeneration of some conversion coating solutions. No mention is made of paint application by curtain coating. It is stated on p. 533 that priming paints "invariably" contain inhibitive pigments, yet red iron oxide is quoted by example in the same paragraph. While the references to the work of Rigg and Skerrey on priming paints are brought up to date, the text is not, and, in particular, still claims that the composition of the underlying metal is of little consequence when a full paint system is applied. It does not seem to be realized that "etch primers" (or pre-treatment primers as they are more often called in this country) can suffer seriously from humid conditions or wetting after, as well as during, application, that low temperature constitutes another hazard and that, while there are considerable variations in proprietary products, there are British products which adequately stand up to these severe conditions. Stoving is not essential to these products and, as the authors admit, they are frequently used on site. One might have expected that this book would include a reference to the improvement of the water-proofing to be attained by incorporation of leafing aluminium pigment in finishing coats.

The definition of a lacquer given on p. 533 is the traditional one, but the writer suggests, in view of the modern range of products, it would be more appropriate to divide unpigmented protective coatings into (*a*) varnishes—which dry by oxidation—and (*b*) lacquers—which dry by other means. Surely it is time that the curing of such coatings by polymerization should be recognized.

The defects in the text referred to earlier call for some caution on the part of the reader, but the book remains a necessity for any organization concerned with the surface finishing of aluminium and its alloys, while the revision which has been made certainly calls for the replacement of the first by the second edition.

F. A. CHAMPION.

Year Book of the Heating and Ventilating Industry. 1960. Technitrade Journals Ltd., Carlisle House, 8, Southampton Row, London, W.C.1. Price 15s. net, plus postage 1s. 6d.

THE thirteenth issue of the Year Book of the Heating and Ventilating Industry, published in collaboration with the Association of Heating, Ventilating and Domestic Engineering Employers, is now available. Once again its purpose is to provide in one compact volume, technical, contractual and other trade information for the benefit of architects, consulting engineers, surveyors and others who are in close contact with heating and ventilating contractors.

The handbook is introduced by a short message from the president of the Association, Mr. W. S. Richards, and is immediately followed by a topical article on Some Considerations in Heating and Ventilating Design, by L. F. Fisher.

The trade and buyers section is again presented in its usual straightforward, easily read manner, with makers and suppliers names listed in product and alphabetical order. Little more can be said about this book, than endorse the President's view, that no responsible heating and ventilating contractor can afford to be without the information collected and presented therein.

High Productivity in Heavy Engineering: Production Inspection and Cost Control in Welded Fabrication. By A. G. Thompson, B.Sc., A.M.I.C.E., M.I.E.S., A.M.I.W. 1960. Iliffe and Sons Ltd. 339 pages. Price 65s. net (by post 66s. 3d.).

THE introduction of welded fabrication into heavy engineering has led to the development of a whole range of new techniques. These techniques have revolutionized the production methods of many firms and indeed of complete industries of which shipbuilding is an outstanding example. In addition, the development of the modern oil industry and commercial nuclear power has been largely dependent on the new techniques which also find application in the manufacture of pressure vessels, liquid storage containers, machine and engine frames, and in structural engineering.

This book has, as far as possible, avoided repeating what has already been published on welding. In the main it is about the technology which has been built up round welded fabrication; accurate dimensioning, coding, methods of transferring dimensions, cutting machines—including computer-controlled flame profiling machines, using punched or magnetic tape, and welding machines. A very full chapter deals with the latest metal-working processes essential for efficient fabrication, and includes details of the various machines which have been specially evolved for pre-forming sheet and plate. Other chapters deal with shop layout; assembly and handling; quality control and inspection, where information is given on the latest methods of non-destructive testing.

The second half of the book is devoted to costing methods appropriate to heavy fabrication. The four chapters on various aspects of this subject include one on productivity improvement, which illustrates, by examples taken from heavy engineering, the specialized approach which is necessary.

This well illustrated book, by an industrial consultant who has made a particular study of this highly specialized subject, will be invaluable to all those responsible for the fabrication of metal by welding—management, engineers, designers, production and planning staffs; while students of all branches of engineering should also find much to interest them

Publications for Industry

Methods of insulating buildings have come more sharply than ever under review since the passing of the Thermal Insulation (Industrial Buildings) Act last year, and the claims of various materials and systems having competitive insulation values are constantly being put forward. That aluminium, in the form of corrugated sheet and foil, has much to offer in this field is shown in an eight-page booklet "Aluminium for Thermal Insulation," issued by Northern Aluminium Co. Ltd., Banbury, Oxfordshire.

It explains why aluminium is both a good reflector of heat and a poor radiator, keeping interiors cool in summer and warm in winter. Since this derives from a surface effect of the aluminium, the thickness of the sheet need only be sufficient for its structural requirements, with much saving in the weight and its durability even in normally aggressive atmospheres ensures a long life for the system incorporating it.

The booklet also illustrates several recommended systems in which aluminium sheet in various profiles is used with and without additional insulation, and there are notes on aluminium foil and its use as a vapour barrier.

* * *

"Molybdenum Disulphide in Action" is the title of a very informative booklet recently published by K. S. Paul Ltd., Angel Lodge Laboratories, Angel Road, London, N.18. The booklet sets out to bring to prospective and current users of their product the experience obtained in this field of lubrication and extracts of letters from users or reports of inspections of specified applications are classified under 14 technical headings. Many informative technical notes are included in each section and a brief mention of the chemical and physical properties of molybdenum disulphide.

* * *

The Ward Group of Companies have recently issued a handsome stiff-backed book containing numerous illustrations of the wide range of new, reconditioned and second-hand machinery, available and on view at their showrooms situated at Sheffield, Grays, Briton Ferry and Glasgow. They are stockists, and in some cases sole distributors, for many well-known British and foreign makes of machines in current use in the steel and metal fabricating industry, and the constantly changing stock position often results in having available quickly the required machine. Another attractive feature emphasized, is the company's long-term purchasing arrangements, which facilitate early or immediate deliveries, at home or abroad. This book is available from their head office, Albion Works, Sheffield, 4.

* * *

The Institution of Production Engineers, through special sub-committees of its Research Committee, has already investigated and reported on the utilization of direct production materials. Encouraged by this work, the investigations were pursued into the fields of alternative and of direct production materials such as oils, paints and detergents and the result was a report entitled "Improved Material Utilization." Setting out to investigate, within the specified fields, the use of raw and process materials in the engineering and allied industries, the work has produced a selection of over 80 proved case studies, fully illustrated, and covering the fields of:—

(1) Finishes and Finishing Materials;

(2) Packaging and Shipping Materials;

(3) Ceramics, Metal Powders and Plastics;

(4) Ancillary Processing Materials.

Copies of the report may be obtained from the Publications Department, The Institution of Production Engineers, 10, Chesterfield Street, Mayfair, London, W.1.

* * *

The Incandescent Heat Co. Ltd., Cornwall Road, Smethwick, Birmingham, have produced a leaflet No. V.59 (1), entitled "Incandescent Gas Atmospheres Division—What we make," describing the range of equipment produced by them. These include gas absorbers, acid fume treatment plant, absorption plant, air conditioning plant, air dryers, air pre-heaters, ammonia dissociators and ammonia burners.

* * *

The new issue of *The Journal of Applied Pneumatics*, Vol. 3, No. 24, 1960, contains features dealing with various applications of pneumatic equipment—water heater manufacture, printing on curved surfaces, brakes for mine winding gear, vacuum cleaner assembly, the manufacture of plastic bottles, a remote signalling device, hoists in a laundry and a special-purpose machine for smoking cigarettes. Copies are available from the publishers, Martonair Ltd., Parkshot, Richmond, Surrey.

* * *

"B.S.I. News" for March issued by the British Standards Institution, 2, Park Street, London, W.1, refers to a new standard, B.S. 3019 entitled "General recommendations for manual inert-gas tungsten-arc welding" and another, B.S. 3228—"Procedures for obtaining properties of steel at elevated temperatures." A revision has also been issued of B.S. 1542—"Equipment for eye, face and neck protection against radiation arising during welding and similar operations"; this deals with spectacles, goggles, face masks, helmets, handshields and fixed screens and requires all these items to carry the certification mark of the British Standards Institution.

* * *

The "Efco" journal, a monthly publication of the Electric Resistance Furnace Co. Ltd., carries in the January issue the second and concluding part of a lecture given by the author, J. McMullen, to invited audiences on "Some Recent Heat-Treatment Developments." The article contains interesting accounts of modern annealing and hardening processes and photographs of some of the equipment in use. The journal may be obtained from the company, at Netherby, 161, Queens Road, Weybridge, Surrey.

* * *

"Pretreatment News" No. 22 issued by the Imperial Chemical Industries Ltd., Millbank, London, S.W.1, contains articles describing the methods of applying Deoxidine and Granodine in the pretreatment of metal sheets used in the manufacture of cars by A.C. Cars Ltd. of Thames Ditton and in the production of fluorescent lamps by Endura Lamps Ltd. of Stanningley, near Leeds, as well as a detailed article describing the use of Ridolene and Granodine in the pretreatment of Dexion, the slotted angle which has such a wide range of use both in temporary and permanent structures. A leaflet is also enclosed referring to the new British Standard B.S. 3189; 1959, "Phosphate Treatment of Iron and Steel for Protection against Corrosion", which now supersedes PD. 539, and also sets out the requirements of Defence Specification DEF 29, both of which publications specify the use of Granodine.

New Plant and Equipment

Automatic Guillotine

FIG. 1 illustrates the Besco automatic roll-feed guillotine recently introduced by F. J. Edwards Ltd., for the fabric, plastics, rubber, and light sheet-metal industries.

The machine is produced in three sizes with a maximum width of blade of 6 in., 12 in., and 18 in., and is suitable for shearing fabric, fibre, cardboard, plastics, etc., and thin-gauge mild steel. It incorporates a unique feature in that the feed adjustment to the rollers can be varied from 0 to 96 in. by altering the throw of the crank end by loosening the knurled nut and screwing the crank end spindle. An indicator on the crank end spindle is set to the required figure stamped on the gib plate. A cutting action for each revolution of the crank is obtained only when the twelve steel trippers, located on the second shaft, are in position.

A chart is supplied giving the number of trippers required for any desired length. Once the machine has been set to the predetermined length, it will continue shearing until switched off. Two guides are provided to keep the material square as it enters the feed rollers; these are adjustable for various material widths. The maximum thickness of material on the standard machines is $\frac{1}{4}$ in., and the approximate capacity in mild steel is 0.024 in. thick.

The machine is designed for bench mounting for hand or power operation. A fabricated stand can be supplied as an extra together with a mild-steel mounting plate to carry the guillotine and motor. Further details can be obtained from the suppliers, F. J. Edwards Ltd., 359-361, Euston Road, London, N.W.1.

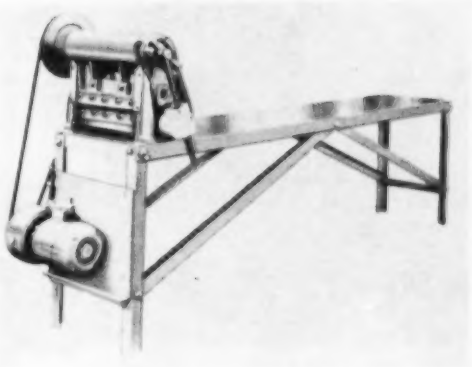


Fig. 1.—Automatic guillotine

Flexible Hose

A RANGE of hoses with the trade name of Vacuflex has been developed by Creators Ltd. by an entirely new process. Having had previous experience in developing and patenting a machine capable of producing steel spring hose on a continuous basis, a special development team was employed on improving the basic principle and soon evolved a machine having a capacity of from 1 in. to 4 in. bore in lengths of 100 ft. or even 200 ft. A new company was formed, Recon (Pipelines) Ltd., with the object of manufacturing and distributing a whole range of piping in Great Britain. The original conception was a polyvinyl chloride vacuum-cleaner hose but further types that have been developed by Recon include rigid pipes and pipes made of nylon, high-density polyethylene, rigid P.V.C., polypropylene and other materials; pipes reinforced with steel spring wire and with nylon filaments are now in production and they can also be reinforced with rayon, cotton and even wire mesh.

Some of the rigid pipes have such a low density that they can float on water and can withstand boiling water for many hours. Among the many applications for which they are suitable in industry are steam exhausts, chemical fume extraction plants, air lines and for machinery where the pipe is not only stationary but where it also oscillates with a moving part of the machine.

Among the characteristics of the new pipes is their lightness in weight and consequent ease of manipulation, and their ability to withstand very high pressures; although they are anti-crush and can stand a man's weight, they can be bent around their own diameter by applying a draught of hot air. In general, temperatures between 10° C. and 80° C. are suitable for both rigid and flexible pipes and temperatures above and below these temperatures may be permissible where no mechanical function is required.

The address to which further information can be obtained is Albert Drive, Sheerwater, Woking, Surrey.

Press Feed for Strip Metal

FIG. 2 shows the Model A.H. press feed produced by Carter Press Feed Ltd., of Thames Road, Haddenham, Bucks, and designed for presses having a stroke of 0 to 4 in. to feed strip up to 2 in. in width at up to 2-in. pitch. It will operate efficiently at speeds of the order of 400 strokes per minute. The construction of the moving head ensures that the forward movement of the strip is linear, maintaining accurate feeding of material between 0.002 in. and 0.080 in. in thickness. The feed incorporates a stock hold-down device.

Fig. 2.—Press feed for strip metal

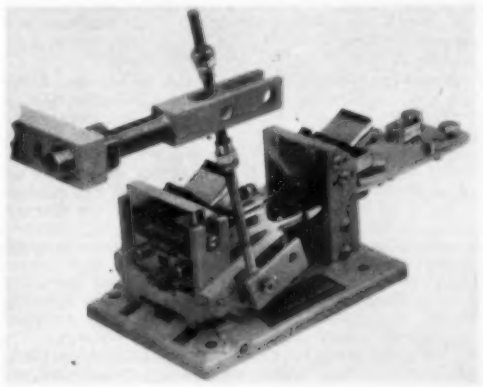


Fig. 3.—Semi-automatic soldering machine

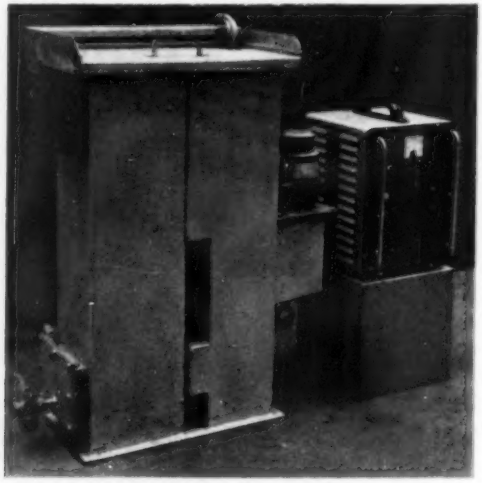


Fig. 4—Metal degreasing plant

Semi-Automatic Soldering Machine

FIG. 3 shows the Smith Universal semi-automatic soldering machine produced by Aktiebolaget Olof Smith, Gothenburg, Sweden, who are represented in this country by Broadway Equipment Ltd., Parway House, 1914-1916, Finchley Road, London, N.W.3. The machine has eight revolving arms which enable the process of feeding the tin, soldering, cooling off and automatic ejection to be carried out in eight stages. The length of soldering seam is 280 mm. (11.02 in.), the minimum diameter of the body 65 mm. (2.56 in.) and the maximum 250 mm. (9.84 in.); the output is 950-2,200 bodies per hour and the power required is 1 h.p. Other models are LM3-2 (seam 380 mm., diameters 75-310 mm., output 650-1,800 per hour), and LM-3, which can deal with seams of 610 mm., diameters of 150-420 mm. and has an output of 400 to 600 bodies per hour; the motor power required in each case is 1 h.p. Gas consumption in cu. m. per hour is coal gas 1, acetylene 0.35 and propane 0.20.

Metal Degreasing Plants

I.C.I. LTD., Millbank, London, S.W.1, is now marketing a series of ultrasonic cleaning plants designed for use with trichloroethylene. The smallest and simplest of these is the "ULV1" (compartment size 9 in. × 7 in. × 7 in. deep).

Ultrasonic generating equipment, made by Dawe Instruments Ltd., 99, Uxbridge Road, London, W.5, is connected to a sealed stainless-steel transducer unit containing barium-titanate elements submerged in cool trichloroethylene in one compartment of the plant. Here, electrical impulses at a frequency of 40 kc/s are changed to mechanical vibrations which produce "cavitation" in the solvent. Cavitation means the alternate formation and violent collapse, at a very high rate, of minute cavities in the liquid, giving an intense scouring action at the surfaces of the work. The high solvent power of trichloroethylene on oil and grease contamination is assisted by the mechanical effect of the scouring, so that insoluble solid particles are effectively detached, even from cracks and pits on metal surfaces. The solvent in the ultrasonic cleaning compartment is circulated by a pump through a filter, where solids are collected, and back to the same compartment. The filter is easily accessible for renewal.

The other compartment in the plant holds electrically heated boiling trichloroethylene below a vapour layer. Vapour rises to the condensing coils, falls as liquid into the ultrasonic compartment and returns to the boiling liquor compartment by over-flowing the weir plate. A water coil prevents the temperature in the ultrasonic compartment from rising above 60 C. and damaging the transducers.

The route of articles through the plant varies according to their condition. Most of the work for which the plant is appropriate is not heavily greased or oiled and can go straight into the ultrasonic cleaning compartment, and then into the vapour above the boiling liquor. Grossly contaminated work should be given a preliminary dip in boiling liquor; in the larger plants three compartments are provided so that a steady flow of work can be maintained. The final immersion in vapour is desirable for safety and economy, as it ensures that work is dry when it leaves the plant.

Safety features include rim ventilation equipment and a thermostat which cuts off the heat if the water fails or if the solvent level falls dangerously low.

Advanced Design for Hollow-ware Machines

FIG. 5 shows one of two machines which have been developed by the Birkenhead firm of Moon Brothers Ltd. specially for hollow-ware manufacturers. They are the first machines to be made in this country capable of fully automatically trimming and curling hollow-ware type stampings or spinnings in one operation; the machines can be set for either operation alone.

The design of both models secures wide range, minimum change-over tools, a speedy change-over, operational safety and a consistently high output. No skill is required to operate them; the operator merely feeds stampings into a chute, either by hand or conveyor, where they are picked up by the feed plate and carried to the chuck and clamped. Cam-controlled trimming cutters remove the irregular excess material from the flange, and this is cleared away in a spiral down a separate chute from the stampings. Cutters are brought in

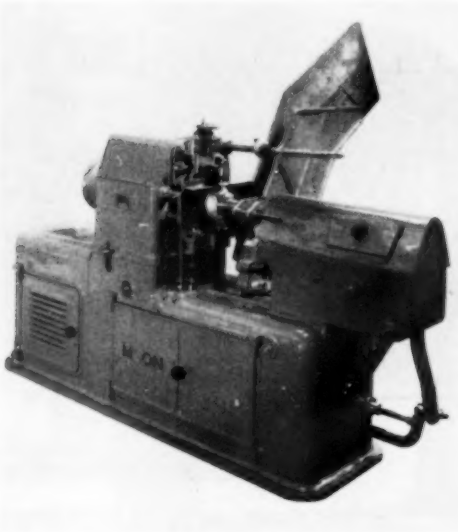


Fig. 5.—Trimming and curling machine for hollow-ware

smoothly, leaving an even width of flange which is then curled by the single curling roll. The trimming cutters are above the chuck and the curling roll below. The stamping is ejected and the next one fed into the chuck.

The two machines, model U.T., and model T.T., cover a wide range of sizes. Adjustments are few and readily accessible; change parts for different sizes of stamping comprise chuck, clamp, feedplate and stripper, and as the changeover can be effected quickly, the machines are particularly suitable for short runs. An electric motor for standard three-phase supply with V-rope drive is incorporated in the machine and guarded to comply with safety regulations.

Each machine is supplied complete with one set of tools to suit one size of stamping and change tools can be supplied to suit any size of stamping to a maximum flange diameter (before trimming) of 14 in. or 7 in., with a maximum depth of 4 in. or 3 in., and a maximum thickness of 0.03 in. or 0.025 in. for the U.T. or T.T. machines respectively. The U.T. model has a top speed output of 28 per minute and the T.T. a standard output rate of 30 per minute.

P.V.C. Ducking Rollers

DUCKING rollers used in the pickling of continuous steel strip can now be fully protected against chemical corrosion. This latest development by Tanks and Linings Ltd., Droitwich, Worcs., is the result of several years' research into the possibility of providing a roller with a plasticized P.V.C. outer skin and was made in close association with one of the leading stainless-steel producers.

The rollers, illustrated in Fig. 6, are constructed almost entirely from rigid P.V.C. and there are no metallic parts whatsoever in contact with the pickling liquid. The stub shaft-ends run in carbon and P.T.F.E. bearings, but a variety of end conditions can be provided.

Because the stainless-steel strip must be completely immersed in a bath of nitric/H.F. acid, it is essential that the ducking roller is fully resistant to the chemical

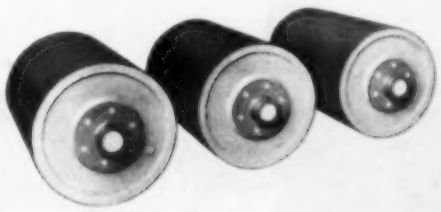


Fig. 6.—Ducking rollers

conditions and, at the same time, able to withstand the mechanical stresses involved.

High-quality strip must not be scratched or marked—it has been found that the P.V.C. outer covering will not pick up and retain metal particles that cause damage.

Portable Wire-Stitching Machine

A NEW, portable wire-stitching machine which makes and inserts staples from a coil of wire, has been developed for fastening materials up to ¾ in. thickness. This machine (Fig. 7) can "staple" through low-carbon steel, aluminium, plastics, wood and paper. The five-pound coil of wire will make approximately 60,000 staples before reloading.

The machine can be actuated by either a foot switch or a micro-switch and is available with single-trip or multiple-trip clutch. The wire used is stocked in 28 different gauges of both round and flat, in standard finishes and colors.

Additional information and specifications can be obtained from the General Staple Co., Dept. "W," 28, East 22nd Street, New York 10, New York.

Fig. 7.—Wire-stitching machine

Fig. 8 (left).—Chain pulley block

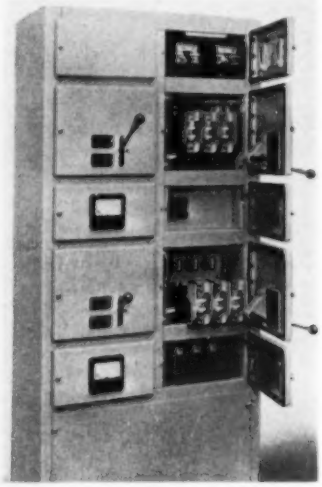


Fig. 9 (right).—Fuse-switchgear

Low Headroom Chain Pulley Block

AMONG the exhibits at the Mechanical Handling Exhibition at Olympia displayed by Geo. W. King Ltd. of Stevenage, Herts., for the first time was the "My-te-Min" Mark II electric chain pulley block (Fig. 8), which incorporated many improvements including electro-magnetic disc brakes, automatic chain guards, unified threads for International standardization, and the new "Snip-Snap" push button control. Less headroom is required and overall weight and size are reduced for greater mobility. Easily detachable load sprockets simplify maintenance and a grease lubricating gearbox eliminates all possibility of oil leaks. Four models are available—¼-ton, ½-ton, 1-ton and 1½-ton capacities.

Fuse-switchgear

FIG. 9 shows the 550-volt a.c. heavy-duty fuse-switchgear produced by George Ellison Ltd., Perry Barr, Birmingham.

The fuse-switches are mounted in a double-tier, two-way or four-way sheet-steel chamber, having a cast-iron door over each switch to house the telescopic operating handle and circuit data plate doors to carry instruments are also provided and separate chambers may be bolted together on the site to provide composite units as desired. Sizes range from 100 amp. to 600 amp. current ratings and they may be three-pole or three-pole and neutral link.

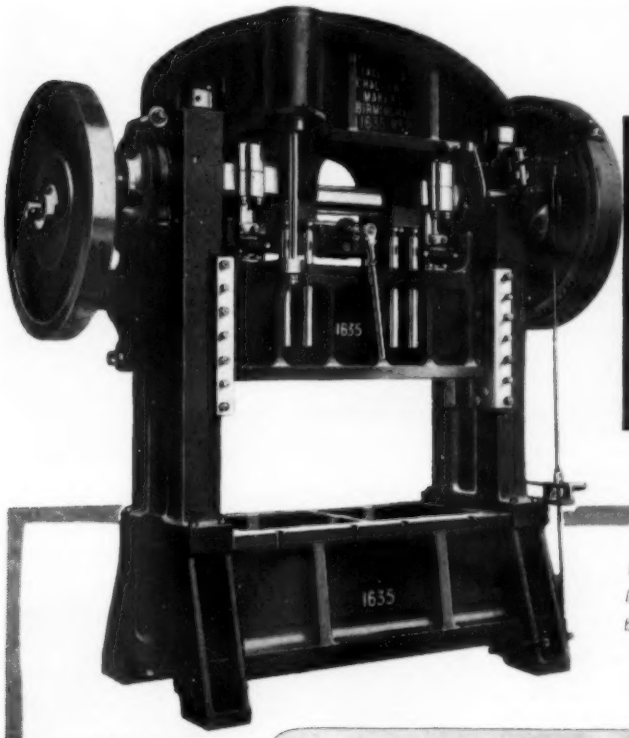
Pneumatic Hand Saw and Hand Miller

TWO tools, the Armstrong Whitworth pneumatic hand saw and hand miller, which are being marketed by the Armstrong Whitworth Equipment Unit at Gloucester, were on show at the Compressed Air and Hydraulics Exhibition in London at the end of April. Although these tools are new products in the commercial sense, they were made, originally, for pneumatic operation by Sir W. G. Armstrong Whitworth Aircraft Ltd. of Coventry, member of the Hawker Siddeley Group, and have been in use in their factories for over ten years; they therefore come into the market as tried and proven tools. They have been constantly developed and improved and their robustness is emphasized by the fact that Armstrong Whitworth is still using hand saws and millers that were built six years ago and apart from routine servicing, have been in constant use on day and night shifts.

The hand miller resulted as a direct development of A.W.A.'s research into lamina flow wings (wings with an extremely smooth surface to improve their efficiency at high speeds). Surface irregularities on the A.W.A.-built lamina flow wings were eventually reduced to 1,000th of an inch in two inches over the whole wing surface by special building techniques and flush riveting. Milling off the heads of thousands of rivets with extreme accuracy presented a problem with the remarkable A.W.52 "Flying Wing" research aircraft with its huge 90 ft. span wing. The motor armatures of electrically-powered tools would not stand up to the strain, so the pneumatic hand miller, with its micro adjustments allowing cuts of hundreds of thousands of an inch, was successfully developed.

When A.W.A. began the production of the Meteor jet fighters, the aircrafts' fuel tanks were fabricated and sealed leaving 800 small bolts from which the ends had to be cut after the self-locking nuts had been screwed home. This was a long and tedious task for fitters equipped only with a hacksaw and production was therefore necessarily slow; following the pneumatic hand miller it was a simple matter to develop a hand saw on the same principle to smooth the bolt ends away in a matter of minutes. Now a large number of these saws are in use throughout the factory for cutting wood, plastics and metals of all kinds. The saw uses the exhaust air for blade cooling, a swarf clearing jet, requires little maintenance and can run for indefinite periods. It uses only three inches of hacksaw blade so broken or used blades (the back end of a hacksaw blade gets little wear) can be used instead of being sent for scrap. Both the tools are patented.

(*Continued in page* 484)



DOUBLE CRANK PRESSES

150 ton Press, 10" stroke; 76" between uprights

WE ALSO MAKE

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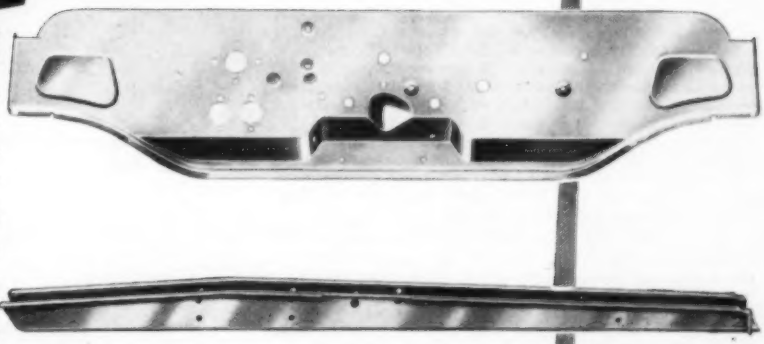
Double Action type Drawing Presses
Open-fronted Presses
Double sided Presses
All types of Automatic Feed Presses
Minting machinery
Cartridge machinery



TAYLOR & CHALLEN LTD

BIRMINGHAM 19

Plate Bending Rolls and Precision Levelling Machine

FIGS. 10 to 12 show three machines recently introduced by the Bronx Engineering Co. Ltd., of Lye, nr. Stourbridge.

Fig. 10 illustrates a 4-roll initial-pinch-type plate bending rolls specially built for a North-East shipyard to deal with mild-steel plate from ¼ in. to 1¼ in. in thickness and 36 in. in width. The rolling speed of the machine is 18 ft. per min. and a full-capacity bend can be made with the plate stationary. The vertical roll-neck bearings incorporate anti-friction thrust bearings fitted on all rolls to take vertical loads in both directions. The two centre pinch rolls are positively driven and the two side bending rolls are idle. Limit switches are fitted to control the travel of the side bending rolls, thus preventing accidental overload. A swing-down end bearing is provided, fully balanced, to allow cylindrical work to be easily withdrawn from the rolls. The horizontal rollers on the baseplate are provided to prevent the plate from falling below the bottom of the vertical rolls. The control gear is mounted in a multi-motor desk type panel with separate contactor gear to operate the 30-h.p. main drive motor, two 25-h.p. side roll adjusting motors and the 5-h.p. motor for operating the back pinch roll. Adequate precaution is taken to prevent scale from fouling the main drive and chock slideways.

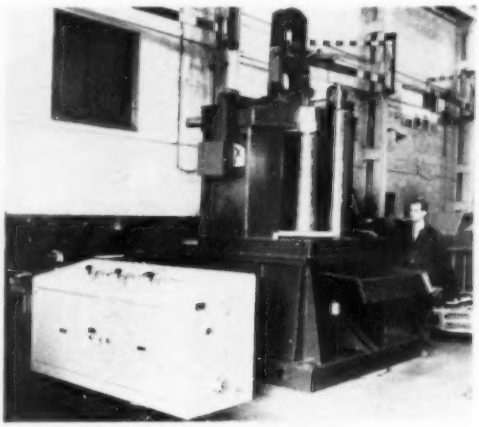


Fig. 10.—4-roll initial-pinch-type plate bending rolls

Another plate bending rolls, built for South Africa, is shown in Fig. 11. This machine has a capacity for rolling mild-steel plate 14 ft. in width, 11 guage in thickness to 13 ft. inside diameter and 14 ft. in width, 10-gauge in thickness to 18 ft. inside diameter. The rolls are machined from 0.4/5 carbon steel forgings of the highest elongation and have a working length of 14 ft. 2 in.; the diameter of the top and bottom pinch rolls is 11½ in., and that of the side bending rolls is 10 in. The bottom pinch roll is adjusted by means of a handwheel and bevel pinions to the worm gearing and an auxiliary drive is provided to the side bending rolls by means of vee belts and jockey pulleys to overcome rolling friction; large indicator dials are provided for roll settings. A pneumatically-operated swing-down housing simultaneously counteracts the dead weight of the top roll when falling; there is also a pneumatically-operated push-off for the removal of completed cylinders. Housings of all-steel fabrication include an oil bath for the worm reduction drives. The main drive motor is 15 h.p. and there are two side roll adjusting motors of 10 h.p. each which give a rolling speed to the machine of 18 ft. per min.

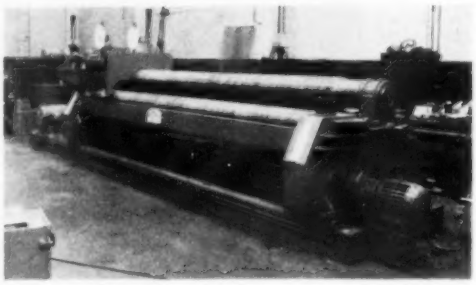


Fig. 11.—4-roll plate bending rolls built for South Africa

Fig. 12 shows a Bronx precision levelling machine of the 17-roll type with triple banks of back-up rolls fitted to the upper and lower banks of the work rolls, operated by a 35-h.p. slip-ring motor complete with reversing starter giving a levelling speed of approximately 40 ft. per min. for mild-steel sheets up to 6 ft. in width and 10 gauge in thickness. The work rolls are of carbon-chrome steel 2¼ in. dia., hardened to 85/90 schlerescope and the top bank is arranged to tilt. The back-up rolls are of carbon-chrome steel of 78/80 schlerescope so that they will not mark the work rolls and are arranged to rest in both top and bottom work roll banks, with the necks running in needle bearings; the back-up rolls on the lower work rolls are adjustable to enable pressure to be directed to the sheet where required. Indicators are provided to show the roll position and a pair of heavy driven pinch rolls are fitted for feeding strip from the coil. The gear box is of fabricated steel construction and all gears and bearings are self lubricating. Housings of heavy box-section fabricated steel are used throughout and a mechanical lubrication system is fitted to all working bearings.

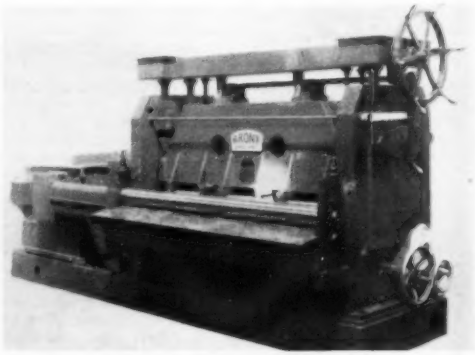


Fig. 12.—Precision levelling machine

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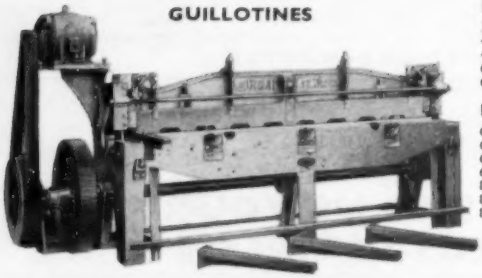

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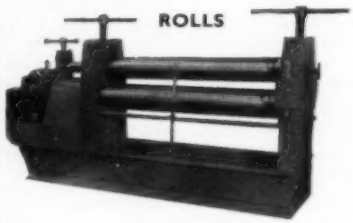

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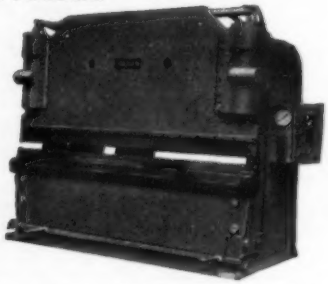

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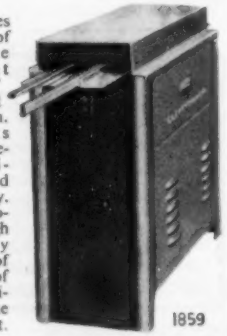

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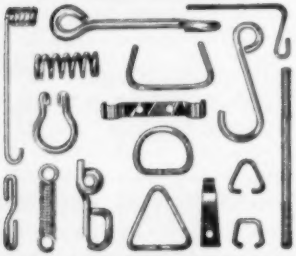

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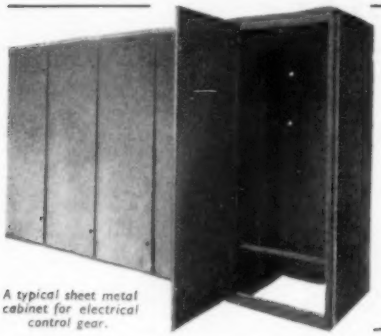

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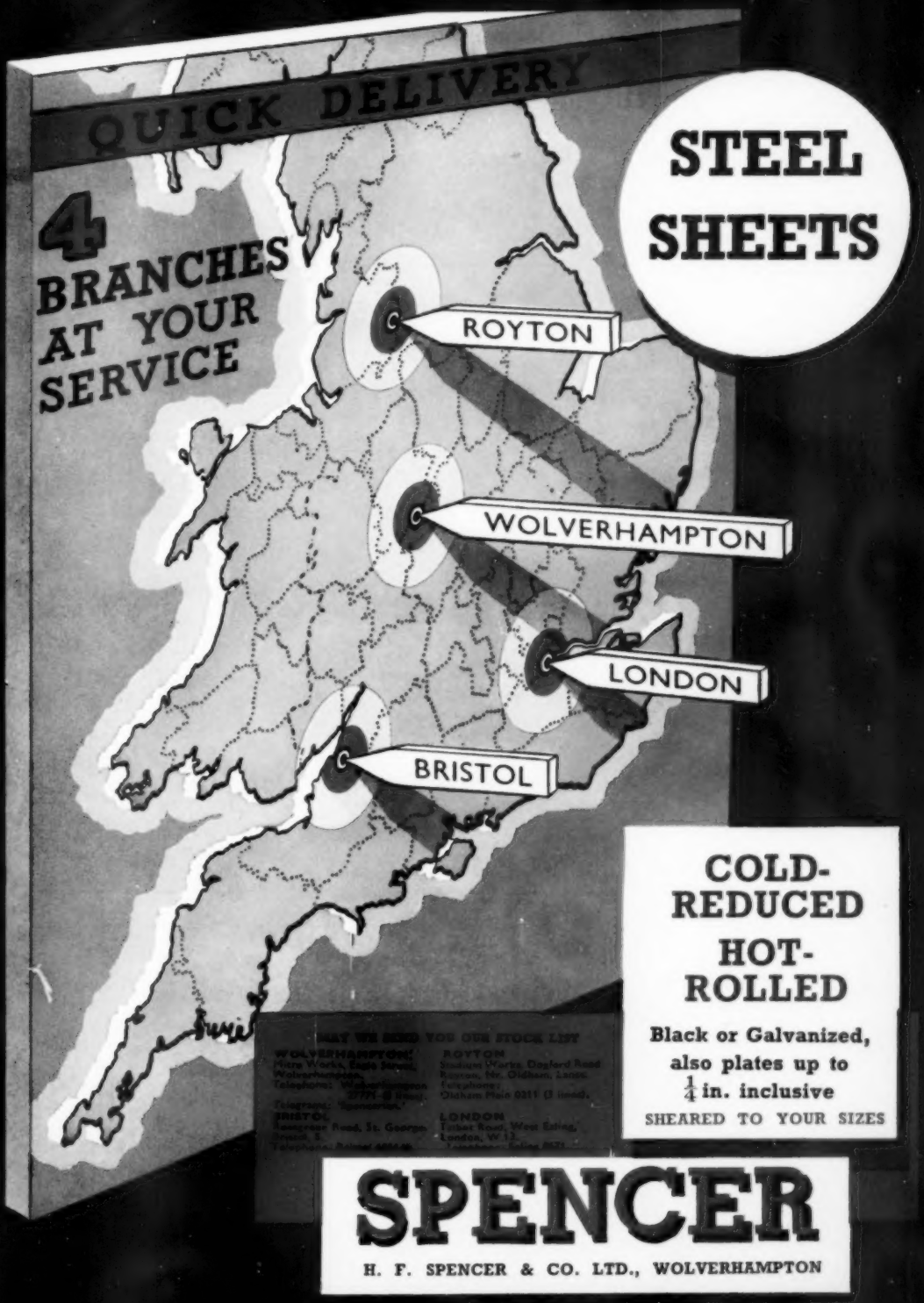
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